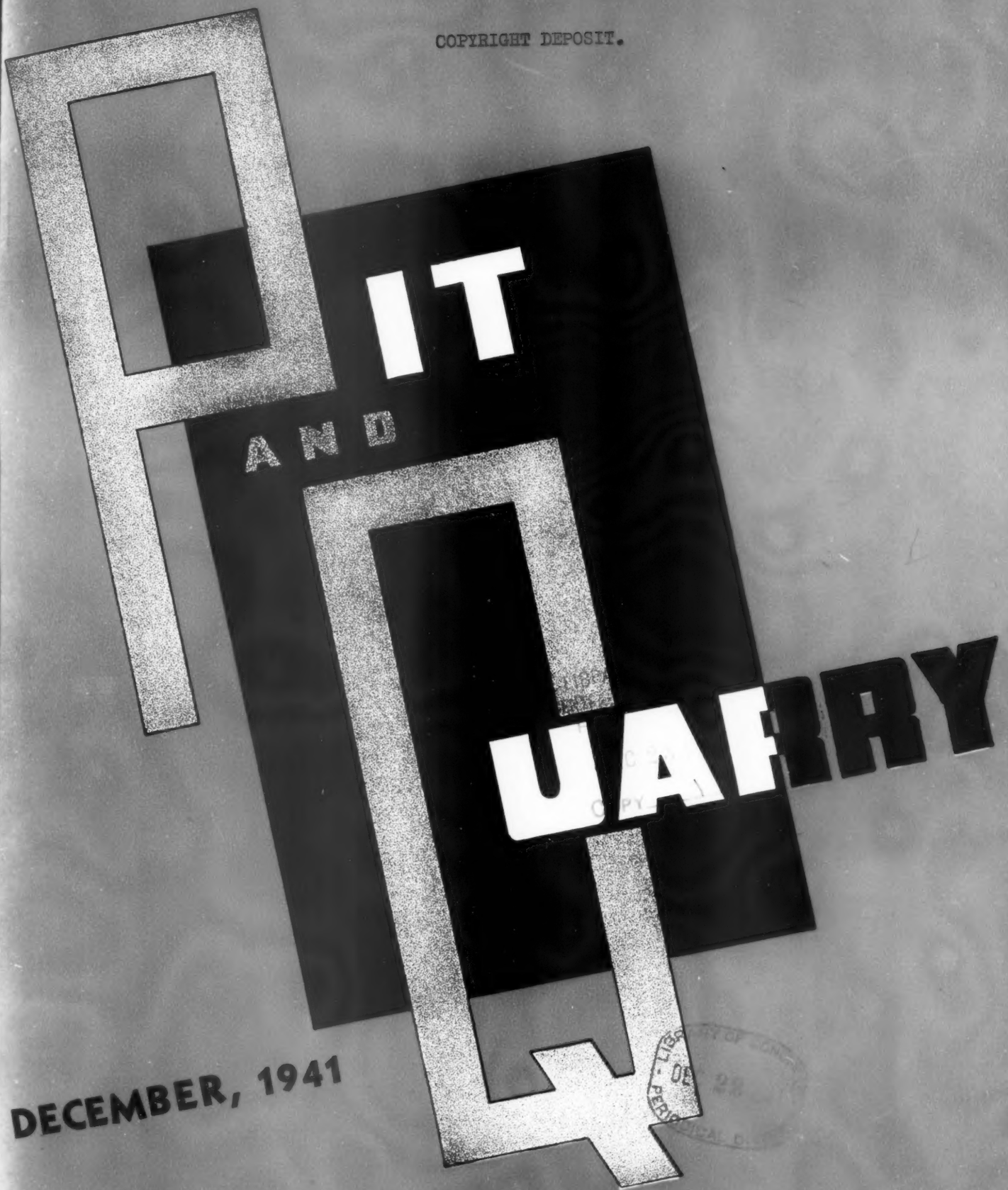
COPYRIGHT DEPOSIT.



DECEMBER, 1941

Aggregates for the Delaware Aqueduct . . . Block Producer Lets Machines Do the Hard Work
Solving a Pit-to-Plant Transport Problem . . . Original Operating Kinks in a Small Plant

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

for super-severe service

●

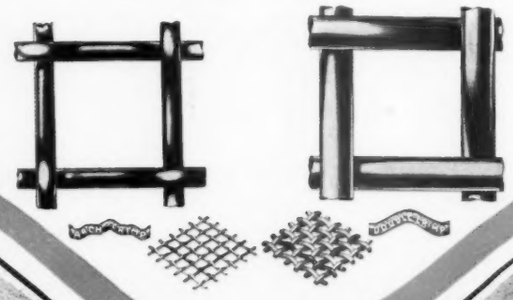
SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—

endure vibration better—

resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

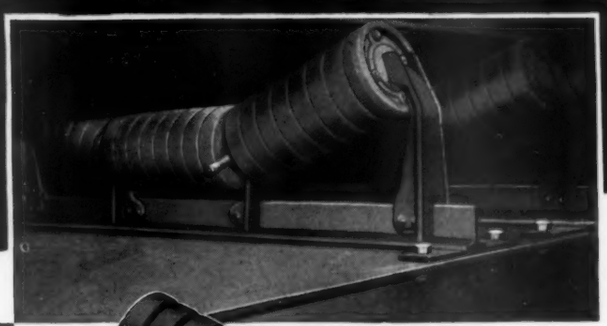
The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

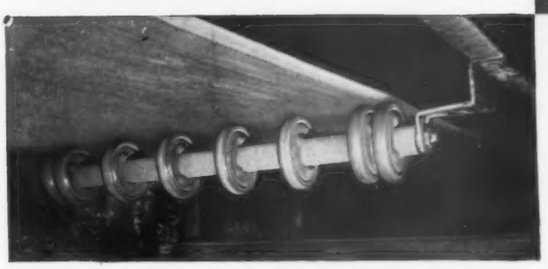
Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY
SAINT LOUIS

LONGER LIFE and GREATER ECONOMY

for Your Belt Conveyor Systems





New LINK-BELT RUBBER-TREAD RETURN IDLERS *for Belt Conveyors*

● Link-Belt Extruded Rubber-Tread return idlers were designed for and are very effective in handling wet, sticky or corrosive materials, and in preventing ice from forming upon belts. By their kneading action they keep the belt clean and prevent a build-up on rolls and belt. Furnished for belts 14″ to 60″ in width. Send for Folder No. A-640.

New LINK-BELT RUBBER-TREAD IMPACT TROUGHING IDLERS

● These idlers, installed at loading and transfer points, definitely prolong belt life by preventing cutting and bruising of belt. The molded rubber discs cushion even the heaviest blows delivered by heavy, lumpy or rough materials, thus greatly increasing belt life, protecting both the idler bearings and framework.

These impact idlers are especially designed for use with Link-Belt standard—Types Nos. 40 and 80 frames in belt widths from 14″ to 60″; also Type 59 heavy-duty frames in widths from 36″ to 72″. Link-Belt Impact Idlers for flat belts are furnished in all widths for both medium and heavy duty. All rolls are interchangeable in Link-Belt stands. Send for Folder No. 1793.

LINK-BELT COMPANY

Engineers and Manufacturers of Materials Handling and Mechanical Power Transmission Machinery Since 1875

Chicago Indianapolis Philadelphia Atlanta Dallas San Francisco Toronto

Offices, warehouses and distributors in principal cities

8804

LINK-BELT

● A TYPE FOR EVERY SERVICE

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • TAKE-UPS • DRIVES

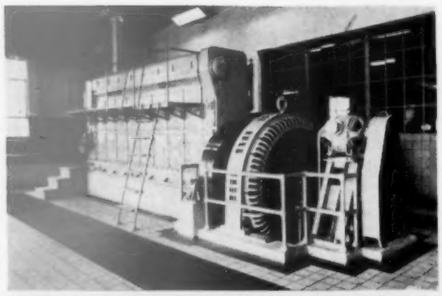
PIT AND QUARRY, December, 1941, Vol. 34, No. 6. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 25 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the Act of March 3, 1897.

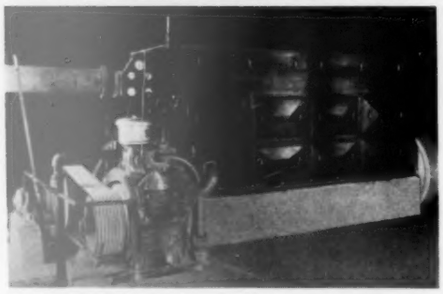
Superior DIESELS

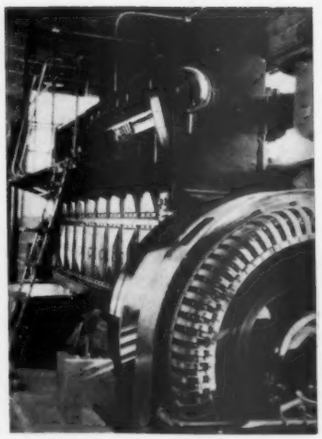
FOR PROVEN RELIABILITY AND ECONOMY

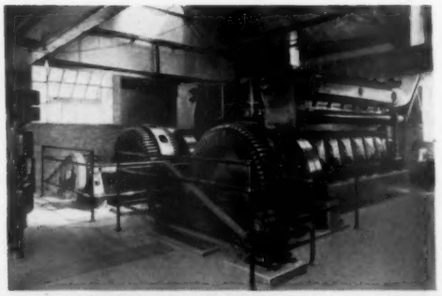
• • • • • in quarries, rock crushing plants, dredges, sand and gravel pits—the hardest kind of a job and the most demanding duty which any engine can be called upon to deliver. Remote locations, long hours, sudden shock loads, frequent overloads, are the rule rather than the exception—but SUPERIORS ARE BUILT FOR EXACTLY THAT KIND OF SERVICE.

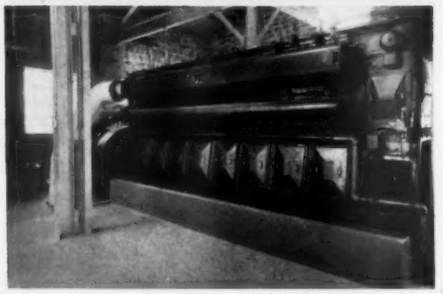
The ever-increasing number of Superior Diesels being installed for this most severe of all services is the best and most convincing argument we know why YOU should have dependable Superior power on YOUR toughest job.











THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

SALES OFFICES: Springfield, Ohio; Philadelphia, Penna.; New York, N. Y.; Los Angeles, Cal.; Jacksonville, Fla.; Houston, Texas; St. Louis, Mo.; Fort Worth, Texas; Tulsa, Okla.; Boston, Mass. FACTORIES: Springfield, Ohio; Philadelphia, Penna.

Serving the Cement Plants

FULLER ROTARY COMPRESSORS

HAVE MANY APPLICATIONS

SLURRY AGITATION

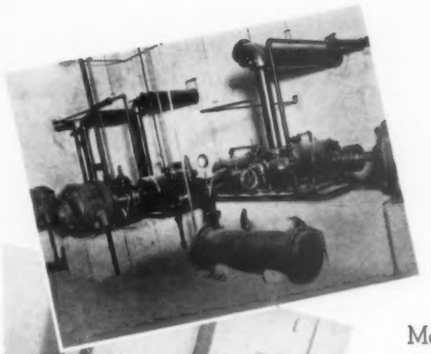
FUEL, NATURAL GAS

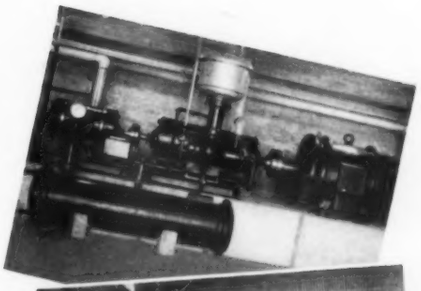
MACHINE SHOPS

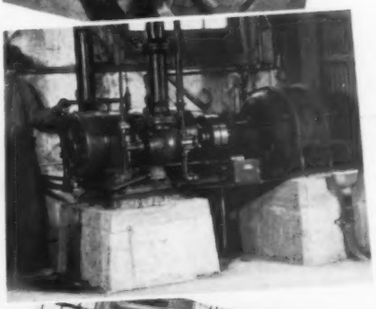
QUARRIES

FULLER-KINYON SYSTEMS FOR DRY RAW MATERIALS, CEMENT, FLUE DUST, PULVERIZED COAL

VACUUM PUMPS FOR SLURRY FILTERS

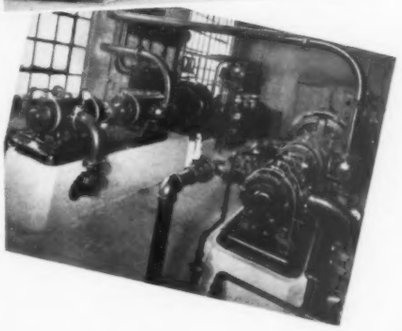


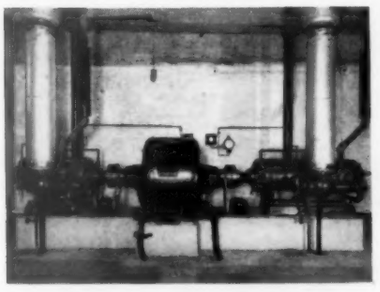


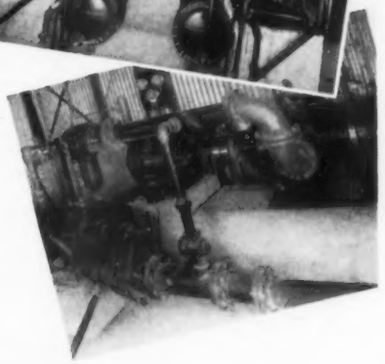


More and more cement plant engineers and superintendents are becoming Fuller Rotary conscious. They're discovering that Fullers are the thing to use for long, continuous service at low operating and maintenance expense. Once a Fuller has been installed, and air demands increase, it invariably follows that additional Fullers are purchased.

Fuller Rotaries have many advantages. When you need additional air capacity, don't overlook the possibilities of Fullers. Our engineers will be only too glad to make recommendations to satisfy your needs.







FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

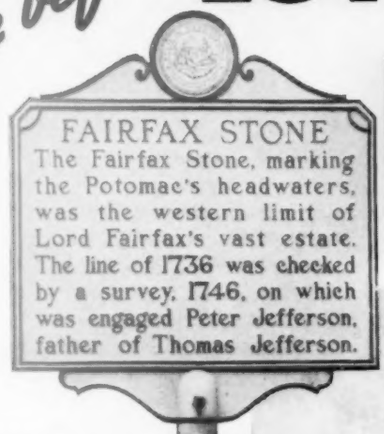
Chicago: 1144 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

C-62

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS

Where history was made before

LOW COST TYPE "R" NEW RECORDS


FAIRFAX STONE
The Fairfax Stone, marking the Potomac's headwaters, was the western limit of Lord Fairfax's vast estate. The line of 1736 was checked by a survey, 1746, on which was engaged Peter Jefferson, father of Thomas Jefferson.

Because the No. 322 Allis-Chalmers Type "R" Crusher can produce large tonnage of minus 3/8" product, both the Type "R" and the roll crusher operate only three hours a day... a big saving in power consumption and man hours for the operators of Fairfax Sand & Crushed Stone.

Let ALLIS-CHALMERS COOPERATIVE

CRUSHER SETS FOR PRODUCTION EFFICIENCY!

Fairfax Sand & Crushed Stone Co., Thomas, W. Va., Increases Capacity 50%... Slashes Operating Costs! Here's a Typical Example of How Allis-Chalmers Cooperative Engineering Works.

A member of the West Virginia Senate for 24 years, the Honorable Abraham Lincoln Helmick is an able business man as well . . . proved by the profit statement of Fairfax Sand & Crushed Stone Co.

On the site of historic Fairfax Stone, the Honorable Abraham Lincoln Helmick, dean of the West Virginia Senate, is making profits in a crushed stone plant that operated at a loss for many years before.

Chief products are railroad engine sand and concrete sand, which formerly were made by passing sandstone directly from a 6″ gyratory crusher to a roll crusher. But over-size pieces quickly grooved to roll faces . . . caused over-size material to pass through the rolls and over the scalping screen as waste for which there was no market.

Then Senator Helmick took over, called in Allis-Chalmers engineers to cooperate with him on a modernization program.

Increases Capacity 50%!

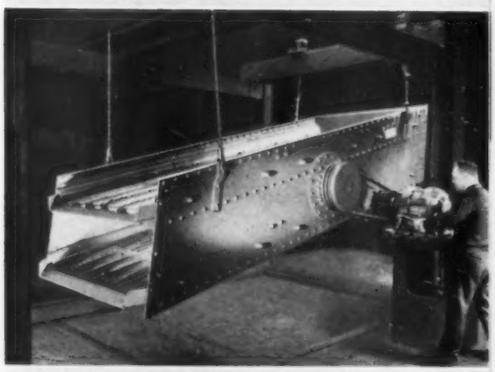
By installing a new No. 322 Type "R" Crusher ahead of the roll crusher, they not only eliminated the high percentage of waste and saved the cost of grinding the crushing rolls periodically... but capacity was increased 50%...operating time of the roll crusher cut from eight to three hours a day! In 1940 Fairfax Sand & Crushed Stone showed a profit for the first time in many years!

That's why Senator Helmick recently gave Allis-Chalmers the order for three modern vibrating screens and a double screw sand washer to replace outmoded equipment—made his plant 100% Allis-Chalmers-equipped!

And that's why, when a production problem comes up in your plant, you'll find it pays to call on Allis-Chalmers. Working with your own engineers, we bring the tremendous inter-related experience of the world's largest manufacturer of rock and ore reduction machinery to bear on your individual problems.

This is our cooperative engineering service. Why not let us show you how it can help you save production dollars? Write Allis-Chalmers, Milwaukee, Wisconsin. A1398

News of other Allis-Chalmers Products that cut your costs!



SMOOTHER OPERATION...INCREASED efficiency... reduced power and maintenance costs — that's what you get with the New Allis-Chalmers Ripl-Flo Screen with uniform circle throw.

THE NEW, LARGER SIZE NO. 636 TYPE "R" Crusher allows more operators to take advantage of the big savings of "Speed-Set" Control. A turn of the hand crank gives instant change of product size.

"I'M TOUGH ON MOTORS!" THAT'S what E. H. Humberstone, Superintendent, Marble Cliffs Quarries Co., Columbus, Ohio, says. That's why he uses Allis-Chalmers Lo-Maintenance Motors — 187 of them like the 10 hp motor shown here on which not one cent has been spent for repairs in 15 years.

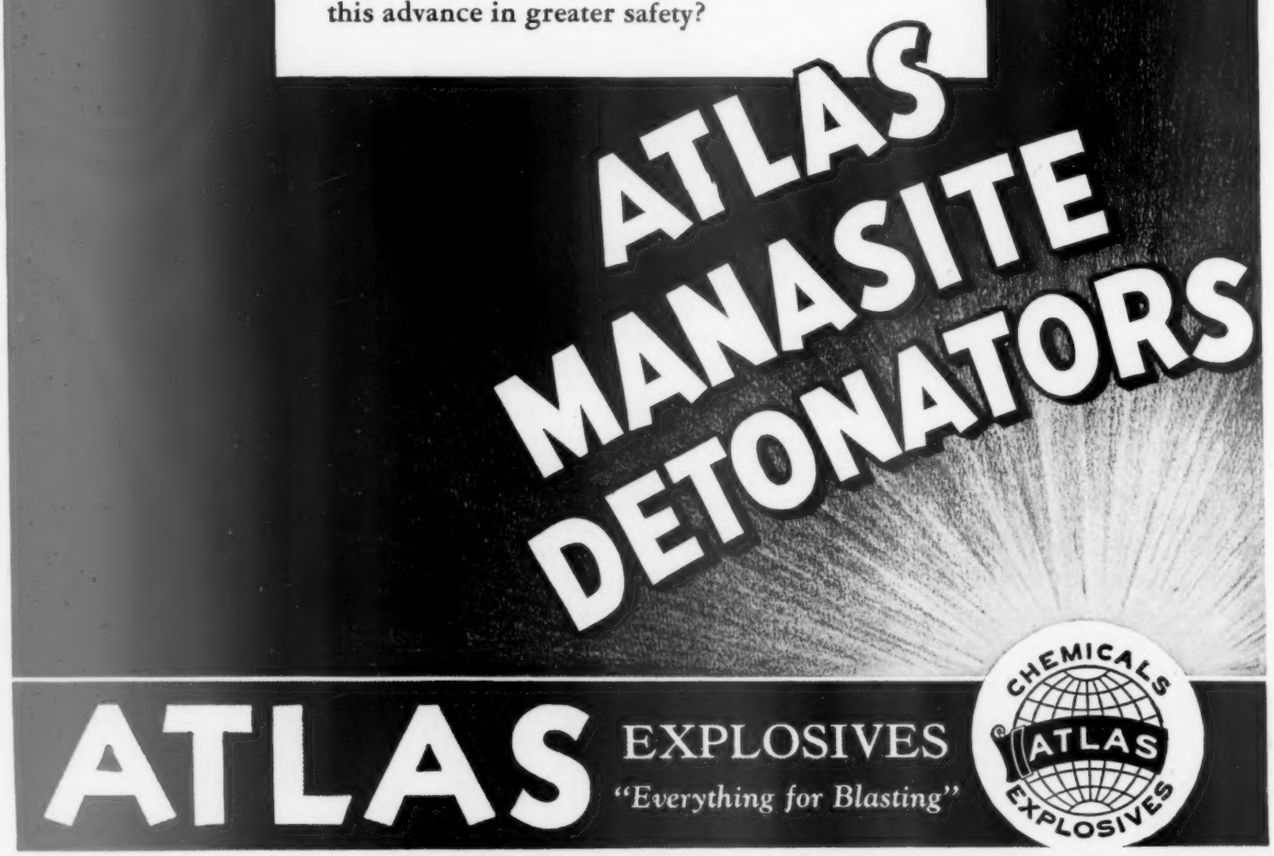
ENGINEERING *Cut your costs*

The Real Question is
Can You Afford *Not* to Use Atlas Manasite Detonators?

In 1938—when Atlas Manasite Detonators were introduced as an important step forward in safer blasting—people naturally asked, "Are they dependable?"

Time has given the answer. In field after field—mining, quarrying, construction, agriculture—Atlas Manasite Detonators have been tried, tested, and approved. Blasters have found that they offer reduced sensitivity to impact and friction—with no sacrifice in efficiency, and no increase in cost.

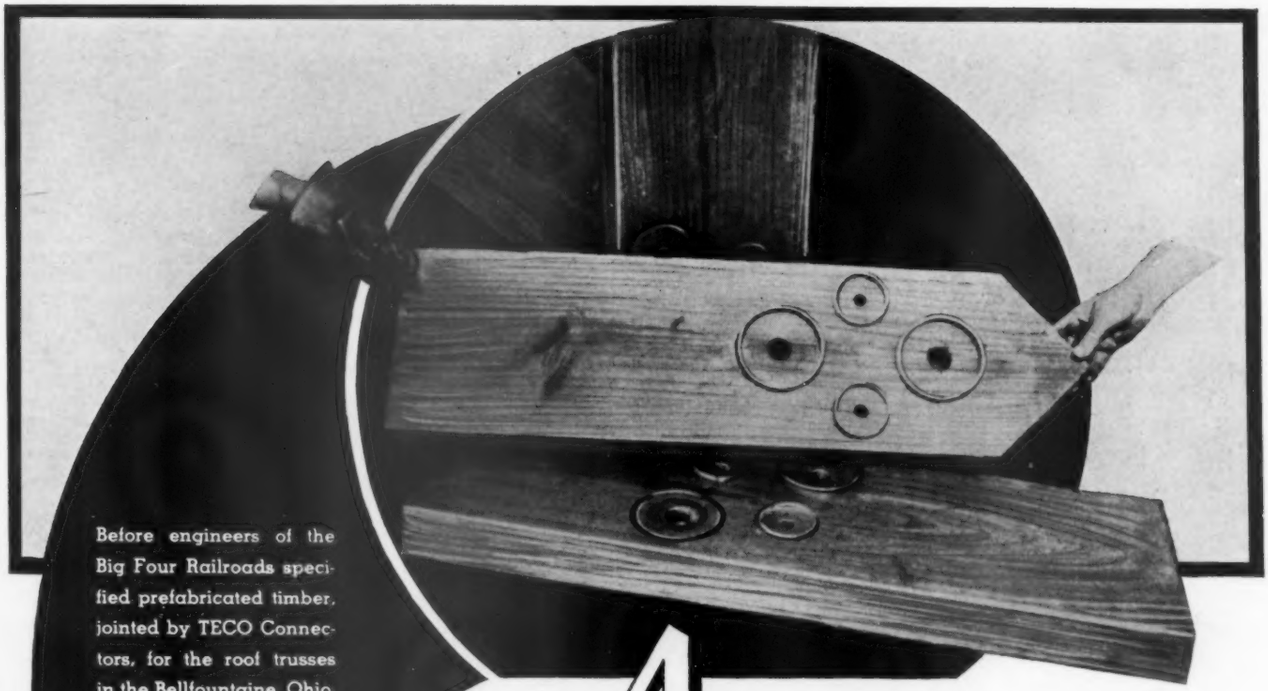
Today, with the dependability of Atlas Manasite proved by over 100 million detonators used, the real question is—Can you afford *not* to use this advance in greater safety?



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco



Before engineers of the Big Four Railroads specified prefabricated timber, jointed by TECO Connectors, for the roof trusses in the Bellfountaine, Ohio, round house, they made this important test:

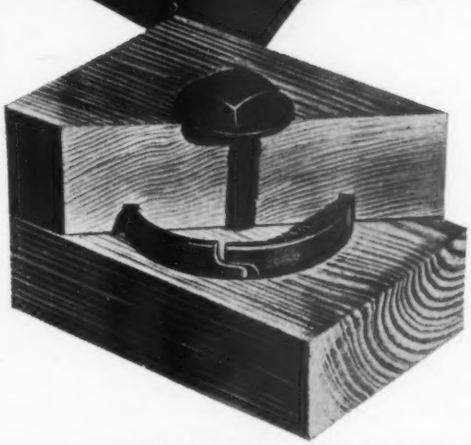
BIG 4 RAILROADS
Test Prefabricated Timber

OK!

Members of one complete truss joint were cut to exact shape and bored with all necessary holes and grooves. The timbers were then creosoted according to American Creosoting Company standards for railroad timbers. This test demonstrated that no hindering irregularity, due to swelling, resulted from the creosoting treatment . . . proof that this faster, more economical method of timber construction can be widely used in railroad work. Another railway maintenance economy!

Prefabricated timber with TECO Connector construction is today's answer to engineering demands for speed, economy, and durability in railway structures. 52 railways say so!

Write for Literature



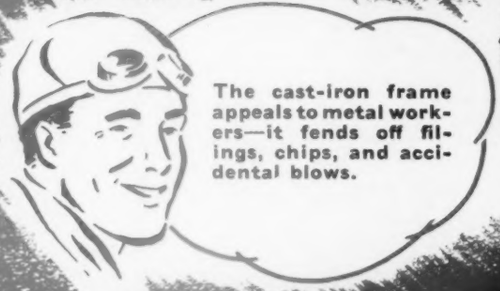
The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

TIMBER ENGINEERING CO., Inc.

Dept. AK 12 1337 Connecticut Avenue,

Washington, D. C.

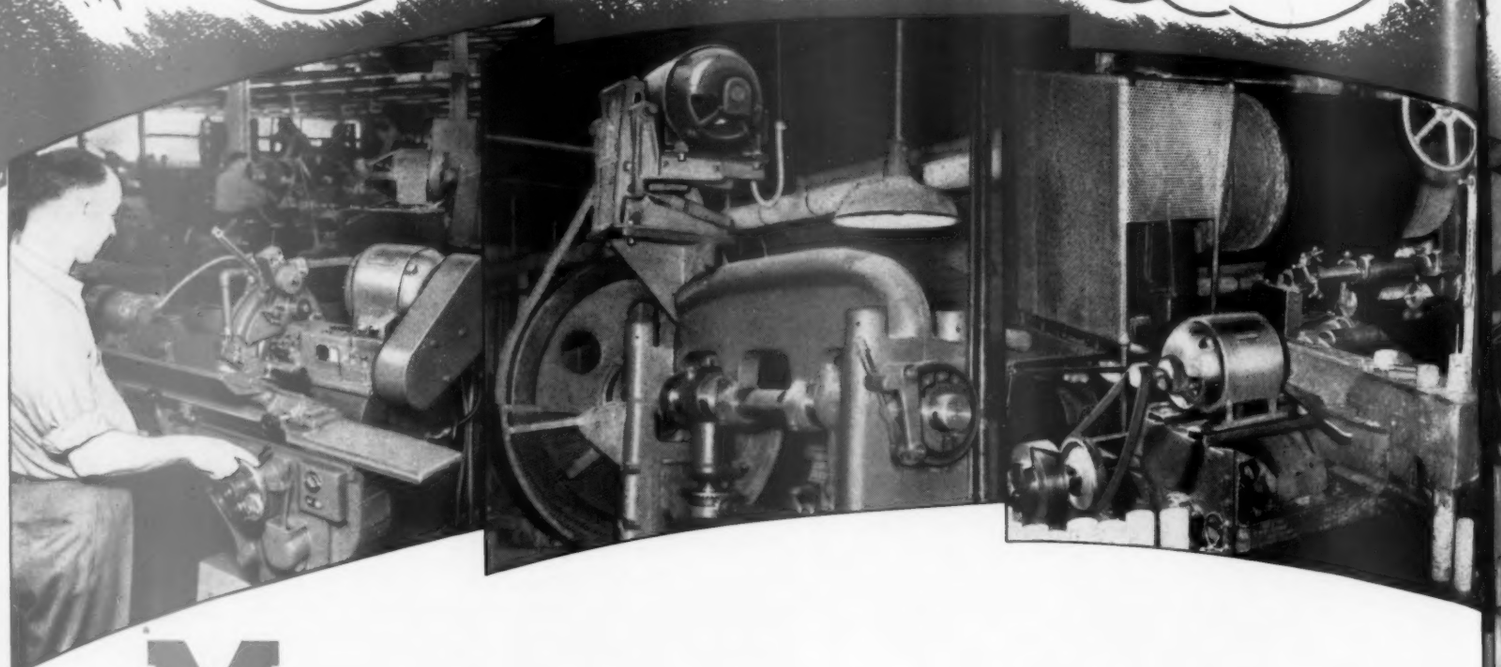
NOW YOU'RE TELLING US....



The cast-iron frame appeals to metal workers—it fends off filings, chips, and accidental blows.

Operating men like the way it stands up under loads in hot surroundings near the ceiling.

The dampness of wet-processing operations doesn't faze this motor. In standard or splashproof types, it's an excellent drive for such applications.



Motor users are proving the case

FOR TRIPLE PROTECTION.....MODERN DESIGN

ACTIONS speak louder than words. In the short time that they have been available, Tri-Clad motors have won a host of friends in a wide variety of industries because of the way they stand up under trying operating conditions. More significant, however, than the extent of their use are the applications in which Tri-Clad motors are seeing "front-line" service. Here are a few tough spots in which they are proving their mettle:

On equipment which must operate in hot or damp surroundings, or where the motor is subjected to flying chips or falling objects—***extra protection against physical damage*** keeps these motors going in spite of this unavoidable abuse.

On equipment responsible for vital defense production—***extra protection against electrical breakdown*** helps to assure continuity of operation 'round the clock.

On equipment which must perform month in and month out without babying by the maintenance crew—***extra protection against operating wear and tear*** prolongs the years of smooth, quiet service.

On equipment which is expected to ***look attractive*** by virtue of smoothly contoured modern design, the functional styling of the Tri-Clad fits in perfectly.

Why not give Tri-Clad motors a chance to show you just what continuous, economical motor operation is? Next time you order a motor or a motor-equipped machine, specify Tri-Clad. ***General Electric Company, Schenectady, N. Y.***

GENERAL ELECTRIC

750-92-8068

WHY TRI/CLAD IS TOPS

REG. U.S. PAT. OFF.

Plant men find Tri-Clad motors easy to maintain. Lubrication features facilitate quick oiling or greasing. Smooth contours can be readily cleaned.

Tri-Clad motors are a cinch to install. Electricians like them because of the roomy conduit box and the permanently identified terminals.

Machine builders and buyers both like the way that these motors blend in with the neat, attractive appearance of modern machines.

GENERAL ELECTRIC

TRI/CLAD

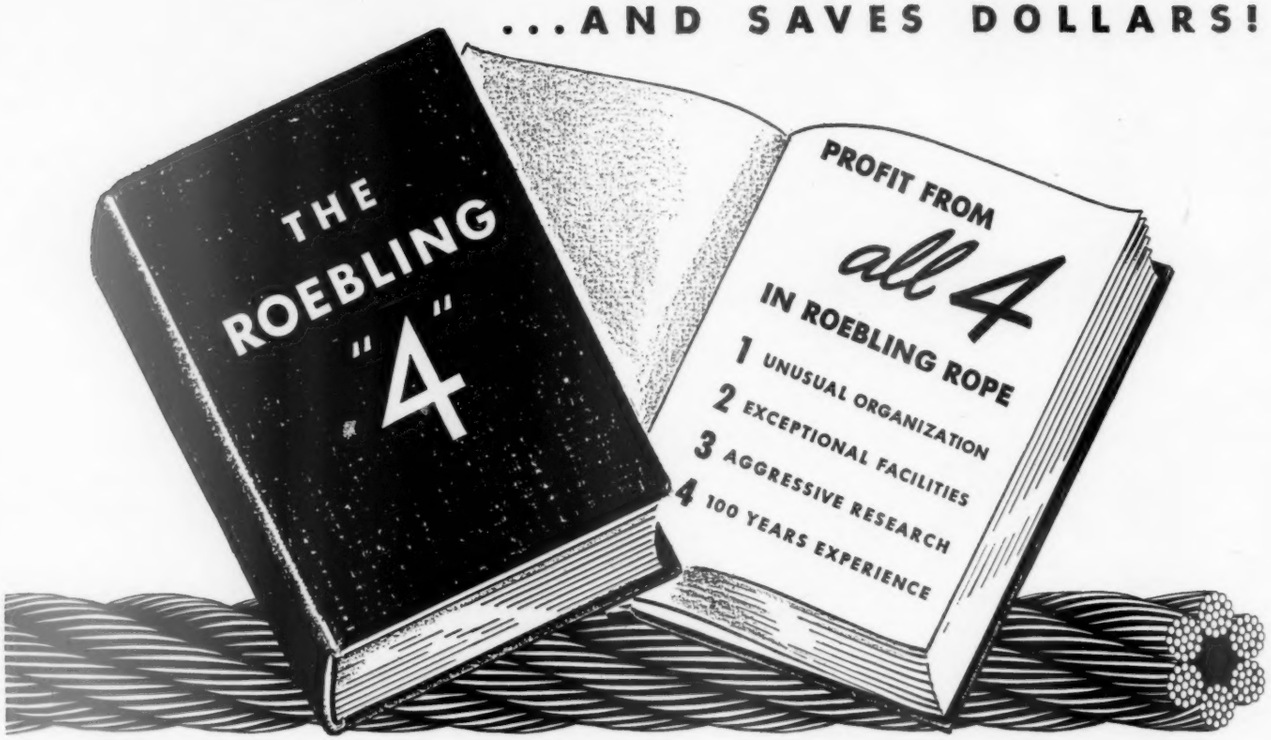
MOTOR

Tri-Clad induction motors are now being produced in 16 fundamental electrical types and 8 basic mechanical constructions. Call your local G-E motor representative for information on availability of types and sizes to meet your needs.

BUILT FOR PROTECTION FIRST...TO LAST!

A WIRE ROPE STORY THAT MAKES SENSE

...AND SAVES DOLLARS!



ROEBLING

"Blue Center" STEEL

WIRE ROPE

PREFORMED AND NON-PREFORMED

Roebling leaves no stone unturned to give you the finest in wire rope. In Roebling "Blue Center" Steel Wire Rope you get the benefit of a combination of advantages obtainable nowhere else. It's a combination we call the "Roebling 4".

Service record after service record has proved that on the basis of *general average* rope operating cost, Roebling "Blue Center" Steel Wire Rope saves money —gives unexcelled performance!

A JOB ENTRUSTED TO ROEBLING VETERANS!

Drawing the wire for Roebling "Blue Center" Steel Wire Rope is a job that calls for great skill and painstaking care.

Most Roebling wire drawers have had from 10 to 35 years of experience!

In Roebling Wire Rope you get the benefit of the extra quality built into the rope by an organization whose skill and experience is unsurpassed.

ROEBLING 1841 1941 100TH ANNIVERSARY

JOHN A. ROEBLING'S SONS COMPANY TRENTON NEW JERSEY

Branches in Principal Cities Export Division: 19 Rector St., New York, N.Y., U.S.A. Cable Address: "Roebling's", New York

Be sure the shovel you buy measures up to this "yardstick"

The Buckeye Vacuum Power Control Clipper Shovel *does!*

	Vacuum Control	Ind. Chain Crowd	175 F P M Min. Hoist Speed	Tubular Dipper Stick	Shatter-Proof Glass	Max. Digging Radius 23' 2"	Max. Dump Height 17' 4"	Safety Power Drum Brakes	Min. 3.25 R P M. Swing	2.23 M P H. Top Travel Speed	Simultaneous Swing, Hoist, Travel	4 Anti-F. Bearinged Hook Rollers	A F Bearings on Main Mchy. Shafts	Min. 16" Crawler Treads	Min. 10'-2½" Crawler Length	Ample Work Space in Cab	Power Boom Hoist and Safety Brake	Flame Hardened Gears	Automatic Swing Brake	Over 12'3" Ground Clearance	Gear, Universal Power Hook-Up	Vacuum Power Trip	Over 57 H P Rating	Weight over 77,000 lbs
Clipper Model 50	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shovel No. 2	No	No	Yes	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	No	No	Yes
Shovel No. 3	No	No	No	No	No	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Yes	No	No	No	Yes	No	No	No	No
Shovel No. 4	No	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No	No	No	Yes
Shovel No. 5	No	Yes	No	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No
Shovel No. 6	No	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	No	No	Yes	No	No	No	Yes
Shovel No. 7	No	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No
Shovel No. 8	No	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Shovel No. 9	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	No	Yes
Shovel No. 10	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No
Shovel No. 11	No	Yes	No	No	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No	No	No	Yes
Shovel No. 12	No	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes

Vacuum Power Control Clippers speed stripping operations and get out more loads per day, for pit and quarry operators.

Of the 24 foremost preference points—design, construction and operating features that most operators prefer—the Buckeye-built Clipper has all 24 *plus* all of the accepted practices of shovel construction.

This gives Clipper owners the inside track on digging jobs—more yards per day—fewer days per job—more yards handled per dollar of investment. It's the outstanding buy in the small shovel field. It's tomorrow's shovel *today!*

Model 50	Model 60	Model 70
½ yd. ✓	⅝ yd. ✓	¾ yd. ✓

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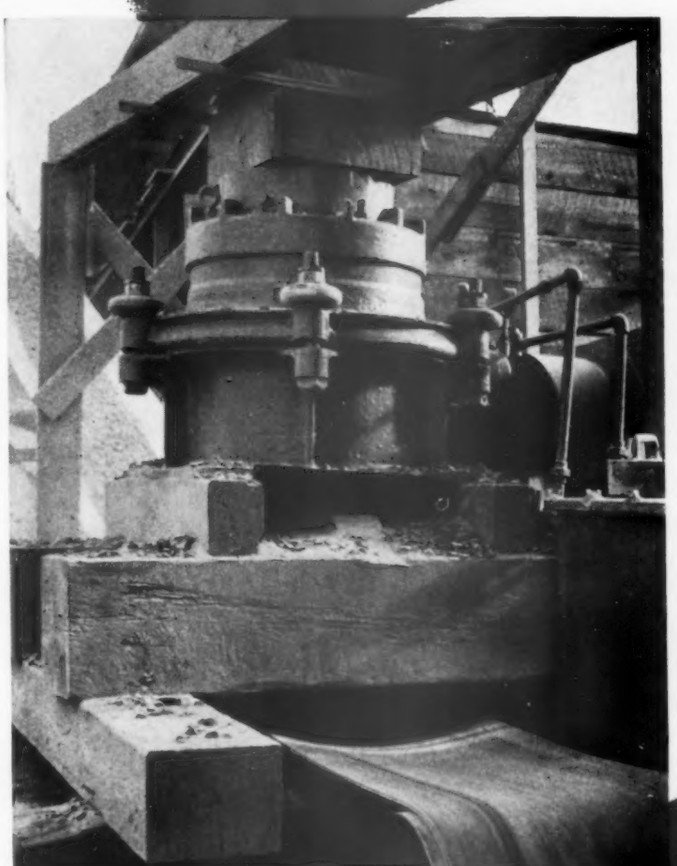

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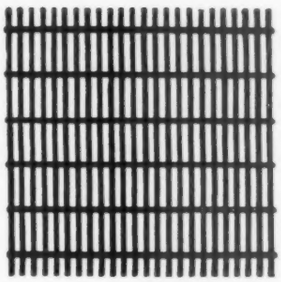

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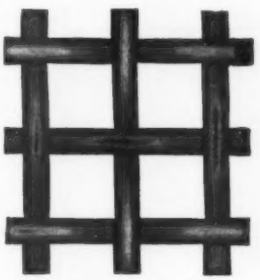

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PIT AND QUARRY

Vol. 34 DECEMBER, 1941 No. 6

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PIT AND QUARRY

CHICAGO DECEMBER, 1941

Wage-and-Hour Law Violation Alleged in St. Louis Action

A consent decree stipulating that 16 employees of the Missouri-Illinois Material Company be paid wages totaling $2,524 under minimum and overtime wage provisions of the Wage and Hour Law and enjoining further violation of the law by the company, has been filed in United States District Court at St. Louis.

The complaint alleged the company failed to keep adequate records and made inaccurate entries regarding the hours of employment of some of its 73 employees. The company, which has its main offices in the Continental Building, St. Louis, produces sand and gravel at six plants.

Lone Star Earns $3.07 per Share in 9 Months

The report of Lone Star Cement Company for the September quarter shows consolidated net profit of $974,346, after provision of $1,580,244 for federal income and excess profits taxes, or $1.03 a share, against net profit of $916,473 or 95 cents a share in the September quarter of 1940, after $427,722 taxes.

For the nine months ended September 30, net profit was $2,908,358, after $3,028,999 taxes, or $3.07 a share, against net profit of $2,288,083 or $2.37 a share in the like 1940 period, after $1,048,103 taxes.

Nelson Predicts Doom of Priorities System

The outlook for construction was presented in a far from optimistic light by government speakers at the fifth annual Construction Industry Conference, at Washington on November 8, but at least the atmosphere was clarified for builders, engineers and contractors assembled from every part of the nation.

Interchange of opinion between industry leaders and defense officials was frank and informal at the conference, which was held under the auspices of the Chamber of Commerce of the United States. Preceding a question-and-answer forum in which several hundred builders participated with O.P.M. division chiefs on the receiving end of the inquiries, Donald Nelson, executive director, Supply, Priorities and Allocations Board predicted the doom of the priorities system as it now operates.

"Millions of priority certificates have been issued," explained Mr. Nelson. "And when the shortage gets worse—in other words, when demand is much greater than supply—the method of priorities certificates will not work. In order to simplify the system, it will be necessary to go to straight allocation."

Stressing the fact that the defense program is rapidly expanding, the director of priorities and head of S.P.A.B. said that defense activities are absorbing 17 per cent. of the national income."

Coming Events

January 12-14, 1942—Buffalo. Annual convention, National Concrete Masonry Association, Hotel Buffalo.

January 28-30, 1942—Cincinnati. Annual conventions, National Sand & Gravel Association, and National Ready Mixed Concrete Association. Netherland Plaza Hotel.

February 2-5, 1942—Cincinnati. Annual convention, National Crushed Stone Association. Netherland Plaza Hotel.

May 26-28, 1942—Hot Springs, Virginia. Annual convention, National Lime Association, The Homestead.

New Johns-Manville Plant Will Increase U. S. Asbestos Supply

An asbestos mill capable of processing large quantities of asbestos-bearing rock is now under construction on the Johns-Manville properties in Chrysotile, Arizona. According to C. H. Shoemaker, vice president of Johns-Manville Products Corporation, the new mill will be in operation early in 1942, and will at that time add substantially to the supply of asbestos fibre available in this country to meet defense manufacturing needs.

The asbestos fibre found at Chrysotile is particularly valuable in the manufacture of filters, woven asbestos materials, asbestos paper, many types of asbestos-cement products, and as fillers in asphalt tile and moulding compounds. The recent development of a special milling process by Johns-Manville engineers has made possible the utilization of this Arizona fibre, heretofore a marginal operation.

Continuous experimentation at the company's research laboratories in Manville, New Jersey, resulted in the construction of a complete pilot mill with an entirely new process, which will allow the fullest use of Arizona's valuable asbestos deposits. Based on this development a large mill is now being built at Chrysotile, while explorations and tests are going on preparatory to expanding the mine itself.

It has been estimated that approximately 100 men will be employed in the mill and mine, and that this number will be increased as the property is developed, making the Johns-Manville operation at Chrysotile Arizona's largest asbestos development.

A contract to quarry and ship 35,000 tons of silica rock from the quarries at Oro Grande to the plant at Crestmore, California has been awarded the A. V. Vannell Company by the Riverside Portland Cement Company.

Potash Company of America Increasing Processing Capacity

Construction to provide a substantial increase in refining capacity is nearing completion at the property of the Potash Company of America at Carlsbad, New Mexico. The plant addition was undertaken as a result of the cessation of imports, the extended strike at the Trona plant of American Potash & Chemical Company, and the increasing use of fertilizers with potash content, all making a shortage of refined salts a probability. It was thought that in addition to supplying the product to the United States, American producers might be called upon to ship muriate of potash to friendly countries abroad.

In his report to stockholders for the fiscal year ended June 30, 1941, G. F. Cooper, president, stated that although gross sales increased over 30 per cent. over those of 1939-40, earnings did not increase proportionately, a most unusual situation with a production rise of this sort. Freight, labor, and supply cost increases, plus much heavier taxes, accounted for the result, in spite of creditable improvements in other operating costs.

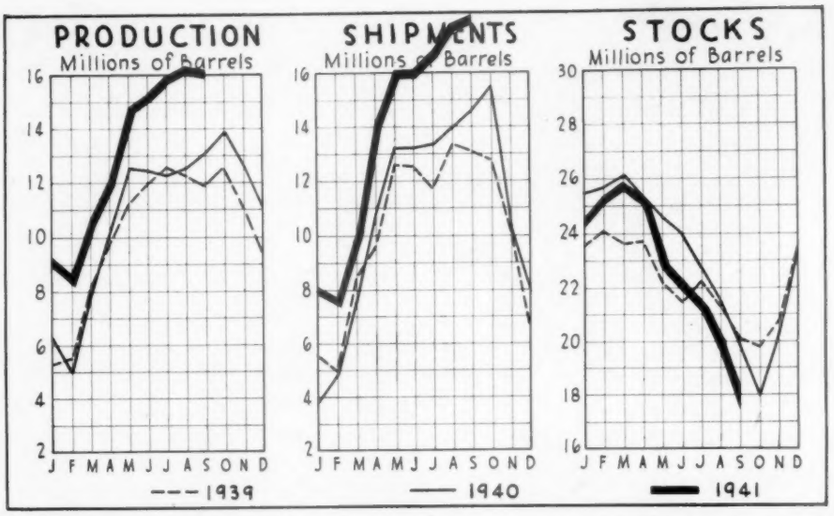
In January, 1941, an increase of about 20 per cent. in production was made by minor plant additions. This left the power supply very close to demand, so that the installation of the 2,400-horsepower Diesel unit ordered last year was urgently needed. The large plant addition, now under way, will again make capacity and demand almost equal and, in view of this, an additional 2,400-horsepower engine has been authorized and ordered for delivery next July. All recent plant additions have been made under certificates of necessity for defense, permitting amortization over five years, and priority ratings for equipment have been obtained in many cases.

All production, including that expected to be made by the new plant additions, through March 31, 1942, has been sold. Net income for the year after provision for income and federal excess profits amounted to $1,309,782. The earnings of the year just closed received the benefit of unusually heavy shipments during the month of June, 1941, which is the first month of deliveries for the new contract year. In addition, although income tax provision rose from approximately 18 per cent. of earnings in 1939-40 to about 34 per cent. in 1940-41, this item will be still higher in 1941-42.

EMPLOYMENT AND PAY-ROLLS

(Compiled for PIT AND QUARRY by Isador Lubin, Commissioner of Labor Statistics, U. S. Dept. of Labor.)

Industry	Establishments	Number of Employees	Pay Rolls (1 week)
Cement:			
July, 1941	137	24,907	$775,879
August, 1941	137	25,190	801,530
Percentage change		+1.1	+3.3
Quarrying and non-metallic mining:			
July, 1941	930	34,985	931,422
August, 1941	930	35,783	993,524
Percentage change		+2.3	+6.7
Cement:			
June, 1941	135	23,731	760,241
July, 1941	135	24,621	766,755
Percentage change		+3.8	+0.9



The Portland-cement industry in September, 1941, produced 16,115,000 barrels, shipped 18,284,000 barrels from the mills, and had in stock at the end of the month 17,563,000 barrels of cement, according to the Bureau of Mines. Production and shipments in September, 1941, showed increases of 23.0 and 24.0 per cent., respectively, as compared with September, 1940. Portland-cement stocks at mills were 11.8 per cent. lower than a year ago.

The total production for the nine months ending September 30, 1941, amounts to 118,573,000 barrels, compared with 92,437,000 barrels in the same period of 1940, and the total shipments for the nine months ending September 30, 1941, amounts to 124,440,000 barrels compared with 95,975,000 barrels in the same period of 1940.

Jerry Soukup Heads Oklahoma Conference

Jerry J. Soukup, owner of the Mountain Park Granite Company, was elected president of the Oklahoma Mineral Industries Conference at Norman, Oklahoma, recently. Mr. Soukup, who with his father founded the granite firm, was born in Czechoslovakia and came to the United States when he was nine years old. The firm established 20 years ago as a "one man" business, now has 25 employees and ships its products to all parts of the nation.

Rock-Wool Worker Hurt in Cupola Explosion

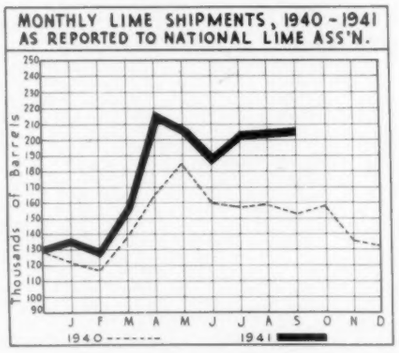
An explosion in a cupola caused considerable damage at the plant of the Carney Rock Wool Company at Mankato, Minnesota recently. One man was injured when he was blown through a window by the blast.

Molten rock which burst from the cupola set fire to the building but it was quickly extinguished.

Lime Operators Hold Meeting at Memphis

Members of the Southeastern Lime Institute gathered at Memphis on October 30 for a business meeting.

The lime makers were the guests of W. W. (Billy) Fischer, head of the Fischer Lime & Cement Company at his country estate.



According to data collected by the National Lime Association, 71 companies in September, 1941, shipped 207,789 tons of lime (123,039 quicklime; 84,750 hydrate). Reporting companies represent 47.2 per cent. of the association's total capacity of record. Based on PIT AND QUARRY'S estimates for the remainder of the industry the total shipments for the month are estimated to have been approximately 440,000 tons. Shipments of lime by use and grade for September, 1941, were:

Use	Quicklime (tons)	Hydrate (tons)
Agricultural	2,316	8,754
Building	20,560	50,499
Chemical	100,163	25,497
Total	123,039	84,750

New Regulations on Wage-Hour Records Are Now in Effect

The Wage and Hour Division has issued a revision of the record-keeping regulations, which became effective September 15, 1941.

Compliance with the regulations is obligatory and it is consequently of vital importance that every employer understand the requirements of these regulations. According to the Administrator about one-fourth of the 48,000 inspections made during the last fiscal year showed employers in "technical violation of the Act through failure to keep the prescribed records."

In general, the regulations have been expanded to require additional information. Employers must now, as a minimum requirement for all employees, show in addition to information previously required, for any non-exempt employees, (1) the occupation of the employee, (2) the time of day and name of day on which the employee's work week begins, (3) the pay period covered by the payment, and (4) every employer making wage additions or wage deductions shall maintain in individual employee accounts a record of those types of items and their credited or debited amounts, as well as specifying dates involved. An employer has a choice, however, with respect to recording earnings. This, according to the Administrator, was to placate the criticism that the requirement of showing weekly earnings for employees paid on a monthly or semi-monthly basis complicated the pay rool records for such employees. Under the new regulations, daily wages may be recorded in lieu of weekly wages.

The requirement of additional information concerning an employee is particularly noticeable in regard to employees exempted from the law because they are either in executive, administrative, professional or local retailing capacity. Formerly, it was necessary only to show the name in full, home address, and occupation of such employees. Under the new regulations, complete information must be compiled, just as if these employees were not eligible for the exemption.

Earnings of Penn-Dixie Show Substantial Gain

The Pennsylvania-Dixie Cement Corporation and subsidiaries report for the 12 months ended September 30, net profit of $1,063,727 after depreciation, depletion, interest, federal income taxes and reserve of $276,500 for contingencies. The above net is equal, after 12 months' dividend requirements on 121,200 shares of $7 convertible preferred on which unpaid dividend accumulations amounted to $80.50 a share on September 30, last, to 54 cents a share on 400,000 common shares. The report states no specific provision for federal excess profits taxes was made as it is believed that neither the corporation nor its wholly owned subsidiaries will have any liability for such taxes for the years 1940 and 1941.

For the 12 months ended September 30, 1940, the company reported profit of $650,117 after depreciation, depletion, interest, etc., but before federal income taxes.

Dillman Sells Floating Equipment to Nugent

Dillman Industries, Inc., of Caruthersville, Missouri, has disposed of its sand-and-gravel fleet to the Nugent Sand Company of Louisville, and announced discontinuation of this branch of its business.

The fleet consisting of the Diesel-engined tow-boat *Kennett Dillman* and the Diesel-electric dredge, *Alert,* also a derrick boat and several barges, has been taken to Louisville in tow of the steamer *Edith Nugent,* to be used on the Ohio River in the vicinity of Louisville.

Novel Insulating Plan Utilized in Cincinnati

Apartments in a new building at Cincinnati are being insulated from one another for both heat and sound in one operation. No longer need the tenant on the first floor help warm the quarters of his neighbor on the third. The ceiling of each room will be insulated with rock wool, held in place tightly against the floor above with steel clamps developed by the Reardon Insulation Company, which has the insulation contract.

By clamping the rock wool tightly against the floor the sound waves o the neighbor's apartment above will bury themselves in the wool to a great extent and stop there. Thus the sounding-box effect of the space between the floor and the plaster below can no longer amplify the sounds to the same extent.

Atlanta Firm Granted Ohio River Permit

A permit has been granted the Smiley Sand & Gravel Company, Atlanta, Georgia by Henderson County, Kentucky, for digging sand and gravel from the Ohio River bed.

Under terms of the contract, the county is to be paid $5 for each 450-cubic yard barge of sand or gravel, and $3 for 275-yard loads.

Motor-Vehicle Users Pay Over 1½ Billions Into State Coffers

Receipts from state imposts on highway users and from other state income applicable to highways totaled $1,631,406,000 in 1940, and of that amount $1,013,321,000 was spent on state-administered highways, according to reports received from state authorities by the Public Roads Administration.

The disbursements for state highways were $201,665,000 more than in 1939, and resulted largely from increases in motor vehicle-user revenues.

Receipts for state-administered highways totaled $1,045.722,000 in 1940. These funds were derived as follows: $754,479,000 from highway user taxes; $13,057,000 from appropriations, bridge and ferry tolls, property taxes and other imposts; $169,942,000 from federal sources; $89,989,000 from bonds and notes; and $18,305,000 from miscellaneous sources.

The disbursements for construction of state-administered highways totaled $463,389,000 on primary state highways, $30,274,000 on secondary roads under state control in 14 states, $26,905,000 on urban extensions of the state highway systems in 24 states, and $2,217,000 on state park and forest roads.

Other disbursements for state-administered highways included $215,093,000 on maintenance of these various classes of roads; $54,535,000 for administration, engineering, equipment, and similar items; $26,925,000 for state highway police; $65,828,000 interest on state highway debt; and $128,155,000 for retirement of state highway bonds, notes and other obligations.

Disbursements other than those for state-administered highways totaled $531.276,000. They included $272,500,000 for county and local roads, $52,792,000 for local city streets, $7,824,000 for debt service on local highway obligations. $46,693,000 for the collection and administration of highway-user revenues such as the gasoline tax, and $198,160,000 of expenditures and fund transfers for non-highway purposes.

Kelb Heads Company to Supply Dam Aggregates

The recently-incorporated firm of Cumberland Quarries, Inc., headed by N. E. Kelb of Indianapolis, formerly with the Ohio & Indiana Stone Company, and well-known to the aggregates-producing industry, has been awarded the contract to supply more than 2,000,000 tons of crushed-stone for the Wolf Creek Dam in Kentucky.

The general contract for the dam is held by S. A. Healy & Company of Chicago.

CURRENT BUSINESS INDICATORS

After three months of comparatively little progress, the upward trend of the over-all rate of industrial activity has been resumed in recent weeks. For October the Federal Reserve Board's composite index of production in manufacturing and mining is tentatively placed at 164 per cent. of the 1935-39 average. This is the highest level that has yet been attained and compares with a revised index of 161 for the month preceding. During the first half of November, moreover, production in the aggregate continued upward without interruption.

Contributing heavily to the recent advance in the composite index of production has been the impressive performance of the steel industry. Despite acute scrap shortages, labor difficulties, and government red tape, steel output in October eclipsed all previous records. According to the American Iron and Steel institute, the total production of steel ingots and castings during the month amounted to 7,242,683 net tons. This represents an increase of 111,042 tons over the best previous month and is 5 per cent. above the output in September. Equally significant is the fact that the total production of steel in the first ten months of this year—68,793,571 tons—exceeds the output of any complete year in the history of the industry.

In other branches of industry gains and losses were about equally divided, but the losses were more than counterbalanced by the extent of the gains. Electric-power production was maintained at record-breaking levels throughout October. Freight-car loadings likewise have remained close to the peak that was reached early in September. Finally, automobile assemblies have advanced steadily since the beginning of the current model year and are now pressing hard against the limits established for the industry by the defense agencies.

Encouraging developments were also in evidence in other areas of business. Under the continuing stimulus of defense expansion construction activity has been held at astonishingly high levels. On a seasonally-adjusted basis the index of construction contracts stood at 157 per cent. of the 1923-25 average in October. Although this is somewhat below the level of the month preceding, it is considerably higher than in any other month of the current year and is nearly two-thirds higher than in the corresponding month of 1940.

It is now abundantly evident that there will be no pronounced slump in building activity as a result of SPAB's dramatic ban on non-defense construction which was reported in these columns a month ago. Indeed, according to a survey of the OPM Bureau of Research and Statistics, the volume of all construction in 1942 is expected to be greater than in any year since 1930, with the exception of 1941. Although not all kinds of construction will share in this activity, the construction industry as a whole is expected to experience an extremely active year throughout 1942.

So much for the record of industrial activity during the past month. Completely overshadowing these developments was the elimination of the system of priority control and the substitution for it of a plan for the allocation of all scarce materials. Since late summer evidence has accumulated that the priorities system was not adequate to control the situation. Priority ratings had multiplied so rapidly during the past few months that in the case of a number of the scarce materials all except the highest preference ratings threatened to become meaningless. Moreover, the paper work involved under the priorities system had grown to unmanageable proportions. Consequently, on November 7 it was agreed by SPAB and OPM to replace the rating system with allocations as rapidly as possible.

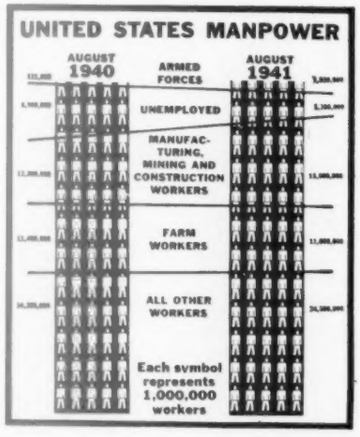
This does not mean that priorities are to be swept away overnight. Priorities will continue to be used to some extent, but they will give way gradually as the requirements for the various materials are delineated. Army, Navy, Maritime Commission, and lease-lend needs will come first, and the remainder will be apportioned for civilian use.

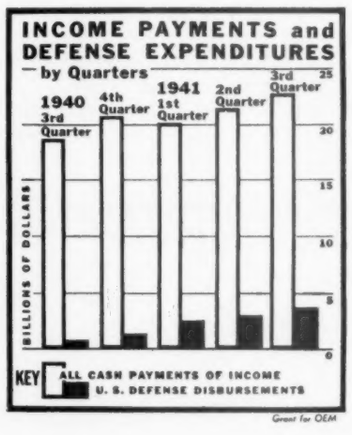
Of more immediate concern, however, is the fact that the real labor crisis is now at hand. As this is written the coal mines of the steel companies have been closed for almost a week by a strike of the United Mine Workers. At the same time a nation-wide railroad strike by the five operating railroad brotherhoods is scheduled for early in December.

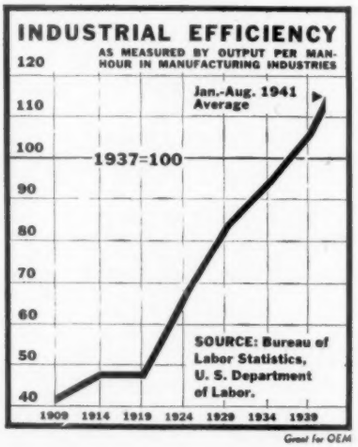
Workers at Manitowoc Sign with A.F. of L.

All workers in the plant of the Manitowoc Portland Cement Company, Manitowoc, Wisconsin, and the firm's storage plant in Milwaukee are now affiliated with the United Cement, Lime and Gypsum Workers' union(AFL).

The agreement was signed in October by Vice-president H. Vanderwerp and Secretary Fredric Pickford, representing the company, and President Aellie Schimmel and Secretary-Treasurer Otto Marek, representing the union.






INDUSTRIAL EFFICIENCY
AS MEASURED BY OUTPUT PER MAN-HOUR IN MANUFACTURING INDUSTRIES
Jan.-Aug. 1941 Average
1937=100
SOURCE: Bureau of Labor Statistics, U. S. Department of Labor.
1909 1914 1919 1924 1929 1934 1939
Great for OEM

Contract-Distribution Offices.—In addition to the 34 Contract Distribution Offices of the OPM published last month, the following new offices are now in operation and the managers named are in charge:

Maine—Portland, Room 501, 443 Congress St.

Massachusetts—Fall River, 27 So. Main St.; Springfield, 95 State St.

New York—Albany, F. J. Holman, State Bank Bldg., 75 State St.; Rochester, Chamber of Commerce Bldg., 55 St. Paul St.

Ohio—Youngstown, 1002 Union National Bank Bldg.

Pennsylvania—Lancaster, 655 Woolworth Bldg.; Wilkes-Barre, 528 Miners National Bank Bldg.

Tennessee—Chattanooga, 909 James Bldg.

Washington—Spokane, T. Wilbur Neger, 629 Old National Bank Bldg.

Maintenance and Repairs.—Although the original Preference Rating Order No. P-22 was published in the October, 1941, issue of PIT AND QUARRY, the changes involved in the amendment are sufficiently extensive to warrant giving the full text of the amended order below:

TITLE 32—NATIONAL DEFENSE
CHAPTER IX—OFFICE OF PRODUCTION MANAGEMENT
SUBCHAPTER B—PRIORITIES DIVISION
PART 958—REPAIRS, MAINTENANCE, AND SUPPLIES

Section 958.1 Preference Rating Order P-22 is hereby amended to read as follows:

958.1 Preference Rating Order P-22. For the purpose of facilitating the acquisition of material for the maintenance and repair of the property and equipment of producers as hereinafter defined, and the continued operation of the property and equipment of such producers, a preference rating is hereby assigned to deliveries of such material upon the terms hereinafter set forth. Such terms shall control until such time as the Office of Production Management certifies specific quantities of such material to which the preference rating herein assigned may be applied, or until the Office of Production Management may specifically limit production by any type of producer or withdraw any type of material from use by such producer, or until the Office of Production Management may issue an order specifically relating to the maintenance, repair and operation of the property and equipment of any type of producer.

(a) *Statement of Policy*

It is the purpose of this order to effectuate the policy of the Supply Priorities and Allocations Board in maintaining governmental, charitable and industrial property located in the United States, its territories and possessions, upon an adequate operating basis, without expansion or improvement of facilities except where duly authorized or approved. The terms and conditions of this order are to be interpreted in conformity with this expressed policy.

(b) *Definitions*

(1) "Producers" means:

(i) Any governmental unit;

(ii) Any individual, partnership, association, corporation, or other form of enterprise engaged in one or more of the following activities or acting in one or more of the following capacities to the extent that it is so engaged or so acts:

(a) Manufacturing, processing, or fabricating;

(b) Warehousing — maintaining warehouses for storage or distribution of any material;

(c) Wholesaling—acting as a distributor of products sold to manufacturers, wholesalers, retailers, or other persons not consumers;

(d) Charitable institutions—any charitable or eleemosynary institution which is recognized as such for purposes of the Internal Revenue Laws of the United States;

(e) Carriers—urban, suburban and interurban common or contract carriers of passengers or freight by electric railway, electric coach, motor truck, or bus, including terminals of any of the foregoing; railroads including terminals; shipping — commercial carriers of freight and passengers by ocean, lake, river, or canal, including terminals;

(f) Educational institutions (including vocational training);

(g) Printers and publishers;

(h) Radio — commercial broadcasting and communication;

(i) Telephone and telegraph communication, including wire services;

(j) Hospitals, clinics and sanatoriums;

(k) Petroleum—discovery, development and depletion of petroleum pools.

(2) "Material" means any commodity, equipment, accessories, parts, assemblies or products of any kind.

(3) Subject to subparagraph (6), "Maintenance" means the up-keep of a producer's property and equipment in sound working condition.

(4) Subject to sub-paragraph (6), "Repair" means the restoration of a producer's property and equipment to a sound working condition when such property or equipment has been rendered unsafe or unfit for service by wear and tear, damage, destruction of parts, or similar causes.

(5) Subject to sub-paragraph (6), "Operating supplies" means any material which is essential to the operation of the producer's business and which is consumed in the course of such business, including without limitation, fuel, lubricants, catalysts, and small perishable tools, *Provided:* It shall not include any material which is physically incorporated, in whole or in part, into any product of the producer, or into any material which the producer distributes to or stores, transports, or services for another person.

(6) The terms "maintenance," "repair," and "operating supplies," *do not* include material:

(i) For the improvement of a producer's property or equipment through the replacement of material in the existing installation with material of a better kind, quality or design;

(ii) For additions to, or expansion of, such property or equipment;

(iii) Which is of a type not heretofore carried on the producer's books under "maintenance," "repairs," "operating supplies" or the equivalent.

(7) "Supplier" means any person with whom a purchase order or contract has been placed by a producer or another supplier for material:

(i) Required by the producer as operating supplies or for the maintenance or repair of his property or equipment, or

(ii) To be physically incorporated in other material so required by the producer.

(c) *Assignment of Preference Rating*

Subject to the terms of this order Preference Rating A-10 is hereby assigned:

(1) To deliveries to a producer, of material required by him as operating supplies or for the maintenance or repair of his property or equipment;

(2) To deliveries, to any supplier, of material:

(i) Required by a producer as operating supplies or for the maintenance or repair of his property or equipment, or

(ii) To be physically incorporated in other material so required by a producer.

(d) *Persons Entitled to Apply Preference Rating*

The preference rating hereby assigned may be applied by:

(1) A producer;

(2) Any supplier provided deliveries to a producer or another supplier are to be made by him, which are of the kind specified in paragraph (c) and have been rated pursuant to this order.

(e) *Application of Preference Rating*

(1) A producer or supplier, in order to apply the preference rating to deliveries of material to him, must endorse the following statement on the original and all copies of the purchase order or contract for such material manually signed by a responsible official duly designated for such purpose by such producer or supplier:

> "Material for Maintenance, Repair, or Operating Supplies—Rating A-10 under Preference Rating Order P-22, as amended, with the terms of which I am familiar."

Such endorsement shall constitute a certification to the Office of Production Management that such material is required for the purposes stated and that the application of the rating is authorized by this order. Any such purchase order or contract for such material shall be restricted to material the delivery of which is rated in accordance herewith.

(2) The producer or supplier placing any such rated purchase order or contract and the supplier selling the material covered thereby must each retain endorsed copies of such purchase orders or contracts, segregated from all other purchase orders or contracts, for a period of two years from the dates thereof for inspec-

DEFENSE PROGRESS

MANPOWER

United States Army, October 9	1,588,500
Navy and Marine Corps, October 1	366,629
Nonagricultural workers, September	*40,065,000
Percent. increase since June 1940	13
18 defense industries, September	*2,660,500
Percentage increase since June, 1940	65

FINANCE
June, 1940, to latest reporting date

Authorized program, October 31	*$63,960,000,000
Contract awards, October 15	* 39,263,000,000
Total disbursements, September 30	10,745,000,000

PRODUCTION

Paid on contracts, June, 1940—September 30, 1941	$8,464,000,000
Combat vessels in October	*5
Merchant ships, October	*10

WEEK ENDED NOVEMBER 8

	Strikes	Workers
Significant defense Strikes in progress during week	12	8,100
Number settled	8	5,700

* Preliminary

tion by authorized representatives of the Office of Production Management.

(f) *Restrictions on Application of Rating*

The preference rating hereby assigned shall not be applied:

(1) Unless the material to be delivered can not be secured when required without such rating;

(2) By a producer to obtain deliveries greater in quantity, or on dates earlier, than required for the operation, maintenance or repair of such producer's property or equipment;

(3) By a supplier, to obtain material for a delivery by him which has not been rated pursuant to this order;

(4) By any producer or supplier to obtain scarce material the use of which could be eliminated without serious loss of efficiency by substitution of less scarce material or by simplification of design.

(g) *Restrictions on Deliveries, Withdrawals and Inventory*

(1) Except as provided in paragraph (g) (5), no producer shall, during any calendar quarterly period, accept deliveries (whether or not rated pursuant to this order) of any items of material to be used as operating supplies or for maintenance or repair the aggregate dollar volume of which shall exceed 25 per cent. of the aggregate dollar volume of the withdrawals of items of material of the same class as carried on the producer's books from stores or inventory during the calendar year 1940.

(2) Except as provided in paragraph (g) (5), no producer shall, at any time, accept deliveries (whether or not rated pursuant to this order) of any item of material to be used as operating supplies or for maintenance or repair until the producer's inventory and stores of items of material of the same class, as carried on the producer's books, have been reduced to a practical working minimum. Such practical minimum shall in no case exceed the aggregate dollar volume of items of material of the same class, as carried on the producer's books, in inventory and stores on December 31, 1940, or, at the producer's option, at the close of the producer's fiscal year ending during the calendar year 1940.

(3) Except as provided in paragraph (g) (5), no producer shall, during any calendar quarterly period, make withdrawals from stores or inventory of any items of material to be used as operating supplies or for maintenance or repair the aggregate dollar volume of which shall exceed the aggregate dollar volume of the withdrawals of such items of material of the same class, as carried on the producer's books during the corresponding quarter of 1940, or, at the producer's option, 25 per cent. of the aggregate dollar volume of the withdrawals of such items of material of the same class as carried on the producer's books during the calendar year 1940.

(4) Notwithstanding the provisions contained in paragraph (g) (1), (2), and (3), a producer may, upon application to and with the approval of the Director of Priorities, in any calendar quarter increase the aggregate dollar volume of deliveries accepted of material for use for maintenance and repair or as operating supplies, withdrawals of material for such use, or inventory of material for such use over the aggregate dollar volume of deliveries, withdrawals or inventory of material for such uses during the last preceding corresponding calendar quarter proportionately to the increase of the volume of goods or services produced or rendered by him in such quarters.

(5) Restrictions contained in paragraphs (g) (1), (2), and (3) shall not apply to any producer during any calendar quarterly period in which the total volume of his purchases or withdrawals of material for maintenance, repairs, and operating supplies does not exceed $2,500.

(h) *Audits and Reports*

(1) Each producer or supplier who applies the preference rating hereby assigned, and each person who accepts a purchase order or contract for material to which the preference rating is applied, shall submit from time to time to an audit and inspection by duly authorized representatives of the Office of Production Management.

(2) Each such producer or supplier shall execute and file with the Office of Production Management such reports and questionnaires as said office shall from time to time request. No such reports shall be filed until such time as the proper forms are prescribed by the Office of Production Management.

(i) *Utilities and Mines Excepted*

This order is not applicable to any utility defined as a producer in g 978.1 Preference Rating Order No. P-46, nor to any mine as defined in g 982.1 Preference Rating Order No. P-56. The Director of Priorities may from time to time specifically except further classes of producers from this order by specific direction.

(j) *False Statements and Penalties*

Any person who applies the preference rating hereby assigned in wilful violation of the terms and provisions of this order or wilfully falsifies any records which he is required to keep by this order, or who obtains a delivery of material by means of a material and wilful misstatement will be forbidden to further apply said rating. Such person may also be prohibited from obtaining further deliveries of material under allocation and be deprived of any other priorities assistance. The Director of Priorities may also take any other action deemed appropriate, including the making of a recommendation for prosecution under section 35A of the Criminal Code (18 U.S.C. 80).

(k) *Revocation of Modification*

This order may be revoked or amended by the Director of Priorities at any time as to any producer or supplier. In the event of revocation, or upon expiration of this order, deliveries already rated pursuant to this order shall be completed in accordance with said rating, but no applications of this rating to any other deliveries shall thereafter be made by the producer or supplier affected by said revocation or expiration.

(l) *Effective Date*

This order shall take effect immediately, and unless sooner revoked shall expire on the 1st day of April, 1942. (P.D. Reg. 1, Aug. 27, 1941, 6 F.R. 4489; OPM Reg. 3 Amended, Sept. 2, 1941, 6 F.R. 4865; E.O. 8629, Jan. 7, 1941, 6 F.R. 191; E.O. 8875, Aug. 28, 1941, 6 F.R. 4483; sec. 2(a), Public No. 671, 76th Congress, Third Session; as amended by Public No. 89, 77th Congress, First Session; sec. 9, Public No. 783, 76th Congress, Third Session.)

Issued this 16th day of October, 1941.

DONALD M. NELSON,
Director of Priorities.

Although the scope of this order was enlarged by amendments announced November 10, these changes do not affect the nonmetallic-mineral industries. The latter are gradually being brought under Preference Rating Order P-56, which applies specifically to mines (see PIT AND QUARRY, November 1941, pp. 39-41). The ready-mixed-concrete and concrete-products industries are covered by Preference Rating Order P-22 reproduced above.

Preference Ratings Mandatory.—A new regulation which makes all preference ratings mandatory has been issued by Donald M. Nelson, Director of Priorities. The new provision is incorporated in Priorities Regulation No. 2, which also:

(a) declares valid all preference rating certificates issued during the period of transition over the signature of E. R. Stettinius, Jr., former Director of Priorities, and

(b) provides specifically for stamping a preference rating on application blanks if this is necessary to avoid delays involved in making out complete preference rating certificates.

Mr. Nelson said that the new legal power to make all ratings mandatory will be of great assistance in effecting strict enforcement of all priority rules and regulations. Increased emphasis is to be put on the enforcement of orders and compliance by all those affected.

The provision of the regulation making all preference ratings mandatory is of great importance. Under the original legislation for priorities, incorporated in Section 2 (a), Public 671 (76th Congress, third session) mandatory preference ratings were assigned only for Army and Navy contracts.

Priorities Field Offices.—The following new field offices of the Priorities Division of OPM are now open in charge of the district managers named:

Connecticut—Hartford, Edwin L. Howard, 805 Main St.

Ohio—Dayton, Harold B. Doty, 32 No. Main St.

Oklahoma—Tulsa, Alfred E. Ballin.

Wisconsin—Milwaukee, Frank J. Tharinger, First Wisconsin National Bank Bldg.

Tires.—Tire manufacturers have been notified by the Office of Price Administration that no objection will be raised to advances in consumer list prices on tires and tubes of not more than 9 per cent. over June 16, 1941 levels, according to Leon Henderson, administrator. However, manufacturers were required to clear their new schedules of list prices with the OPA before issuance so that the increase would not become effective until around October 20. The action was taken as a result of higher costs for rubber, cotton, other materials and direct labor. The extent to which the increase will be reflected in prices paid by consumers is uncertain, since ordinarily they purchase at varying discounts below list prices. The advance in consumer list prices for tires will increase the average wholesale prices received by the manufacturers from 11½ to 13½ per cent., depending upon the discount schedule of the manufacturer. These latter figures include the advance of 5 per cent. in wholesale prices approved by the OPA late in July. Manufacturers will be required to maintain all discounts in effect June 16 unless changes are approved by the OPA. Federal excise taxes will be shown as separate additions to list prices.

EDITORIAL

Is This Freedom's Last Stand?

PEOPLE who value liberty are deeply concerned about the future of freedom. In a world wherein every form of liberty is being violently suppressed, wherein the right of men even to think for themselves is being made increasingly difficult to exercise because of restrictions placed on the sources of information and on the channels of its distribution, wherein the open expression of opinions hostile to ruling *régimes* and even the asking of innocent questions prompted by a natural desire to know are construed as acts of treason—in such a world it is not strange that freedom-loving men should be terrified by the growing threats to liberty.

It is because this feeling is so widespread that men everywhere are looking upon the present world strife as no simple rivalry between economically ambitious nations, as no simple dispute over political boundaries, as no ordinary controversy over the balance of power, but rather as a great upheaval in the history of civilization, as a frantic struggle to free man from the suffocating fumes of intolerance, to enable him to enjoy the fruits of his labor, to experience the happiness of a free and noble life. Millions of men are ready to make the supreme effort, to sacrifice even life itself, if they can obtain, not for themselves alone, but for the generations yet to come, a world in which freedom is secure, in which it will be impossible for any one man, any one group, any one nation, again to plunge man's best achievements into the mire of despotism, to block every avenue of his natural and proper aspirations, to stifle in him every decent desire to improve the lot of himself and his descendants. Growing numbers of people are coming to look upon World War II as freedom's last stand, the last opportunity to grasp and hold firm the dearly bought liberty of man.

Freedom means different things to different men. To the worker freedom symbolizes his right to earn his living, to choose his field, to cease work, to unite with his fellows, to labor free from the restraints and fears of unemployment and insecurity. To the employer it means the right to hire and fire for reasons satisfactory to himself, to open or close his factory, to set his wages and fix his prices, to do what may seem necessary to insure the making of a profit. To the scientist freedom is the right to prosecute his search for truth without hindrance imposed by the state or the church. To the theologian it is the right to preach his doctrine, to worship his god or gods, to try to win converts to his creed without fear of persecution. To the physician it is the right to practice his skill in the interest of humanity unhampered by the dogmatic opposition of theology or politics. To the lawyer it is the right to prosecute or defend in the interest of justice and to advocate the passage of new laws without restraint from the forces of tradition. To the sociologist it is the right to explore the possibilities of providing a better environment, a better life, a better chance for happiness for greater numbers of people without the suppression exercised by vested interests and enthroned privilege.

To the average man freedom is the right to do whatever seems best to him and the obligation to respect the same right possessed by others. Freedom is the right to choose—to investigate, to consider, to decide, to act. Freedom is the right to make a selection among available alternatives, to weigh advantages and consequences, to assume the responsibility of individual action.

Men who can do those things are free, but no man who is afraid can be free. Fear kills initiative, it stifles ambition, it blights hope. Fear crushes the desire to look ahead, it prevents planning, it limits the placing of confidence, it closes the gateway to opportunity. The fear of unemployment, the fear of business failure, the fear of ill health, the fear of economic or political oppression, the fear of war, these and a dozen other fears haunt men's lives, not alone in America but in every so-called civilized nation of the world. Fear makes men mistrust their own governments as well as those of other countries, it makes them mistrust their employers or their workers, it makes them lose confidence in one another; ultimately it makes them mistrust themselves. Fear inspires hate and hate begets strife. The man who fears another tries to overcome him; the nation that fears another tries to conquer it; the man who fears the consequences of an economic "system" tries to upset it; he who fears that he is unable to meet the trials of life turns to suicide to escape it. Others, lacking the courage to assume any kind of responsibility, submit to oppression and form the hordes on whose bent and broken backs the tyrant marches on to conquest.

IF this be, indeed, freedom's last stand, then the fight to preserve it had better be good. But to be good, to be the bringer of good consequences, to be the guarantor of a better life for the people of the world, this fight must be fought for a newer and enlarged kind of freedom—freedom from the tyranny of words as well as from the tyranny of men. There must be a reshaping rather than a restoring; it must be a rebuilding and not a repairing. New ideals must replace the old; the principle of freedom must find new expresson, new applications; it must permeate the field of economics as well as that of politics; it must free man as an individual from the oppressions, repressions and suppressions that have afflicted him. For the group privileges built up under what was but a partially-understood freedom there must be substituted freedom for individual men and women, a truly new order that will deserve and win the respect of all people and give meaning to the "democracy" of which in past days we have been too much inclined to boast. To be of any lasting significance to any single man or to any group of men this new freedom must be available to all men; its fruits must be denied to none.

If men are ready to fight for such a conception of freedom, they can remake the world, they can refashion life and bring new meaning to it. If they are not, or if they are not prepared to wage a struggle for a freedom that will carry conviction to the world's peace-hungry millions, then this will in truth be freedom's last stand. If the forces of aggression and retrogression are allowed to conquer now, men may never have another chance to make themselves truly free.

The chief of the State Geological Survey, Dr. M. M. Leighton, at his desk in the new building.

ILLINOIS GEOLOGICAL SURVEY'S NATURAL RESOURCES BUILDING

Apparatus for making fluorine chemicals. Anhydrous hydrofluoric acid, obtained from fluorspar, is transferred from the cylinder through a condenser to the "bomb" beside the chemist's left hand. In this bomb reactions take place under heat and pressure to produce some of the new fluorine chemicals.

X-ray diffraction equipment for the study of the constitution of stone and its products.

One of the corridors in the building showing the exposed, readily-accessible service pipes.

View looking down one of the aisles of the sample-storage room. Here are stored representative samples of the various rocks and minerals found in Illinois now readily available for study.

View in the foyer showing the adaptability of the new Joliet stone for interior decoration.

The new Natural Resources Building at the University of Illinois, home of the State Geological Survey and the State Natural History Survey. The building has five fully-developed floors for laboratories and offices.

Illinois Mineral-Research Work Now Concentrated in Fine New Structure on University Campus

UNIQUE in this country is the new Natural Resources Building at Urbana, Illinois. It houses the State Geological Survey, an organization devoted entirely to the development through research of the mineral resources of the State of Illinois. Here under one roof are provided modern offices and laboratories equipped with the latest instruments and facilities for scientific research. On the survey staff are geologists, chemists, physicists, and economists—all focusing their research efforts jointly on problems relating to a thorough knowledge of the mineral resources of Illinois and their better and increased commercial utilization.

The exterior of the Natural Resources Building is of brick with stone trim. Its style is Georgian in keeping with the architecture of the University of Illinois campus in general on which the building is located. The structure was built and equipped at a cost of $770,000, funds being supplied by the state and the Public Works Administration.

The building, which also houses the State Natural History Survey, consists of five floors, all fully utilized as offices and laboratories, and an attic suitable for storage. In the basement and first floor are laboratories and offices devoted to research on stone and stone products as well as a storeroom wherein is kept a large number of samples of various rock materials found in Illinois, readily available for reference or for use in research. Four of the third-floor chemical laboratories are given over to chemical research on stone and stone products; others are used for chemical, X-ray, and spectrographic analysis.

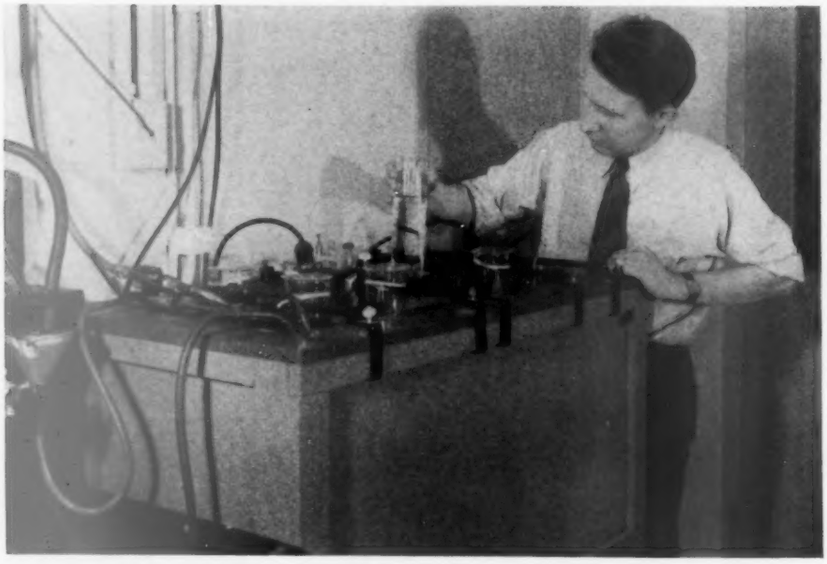
The construction and arrangement of the building throughout is designed to provide flexibility so as to adapt it to such alterations or changes as may be required by the varied research programs. The pipes for all services such as gas, water, and compressed air, are exposed for ready access and the trunk service pipes from the basement to the fourth floor are carried in the stair wells.

Of particular interest to the stone industry is the beautiful foyer with its walls of hone-finished Joliet stone, a new interior decorative stone quarried near Joliet, Illinois. The foyer is dedicated as a permanent exhibit of this new Illinois structural stone.

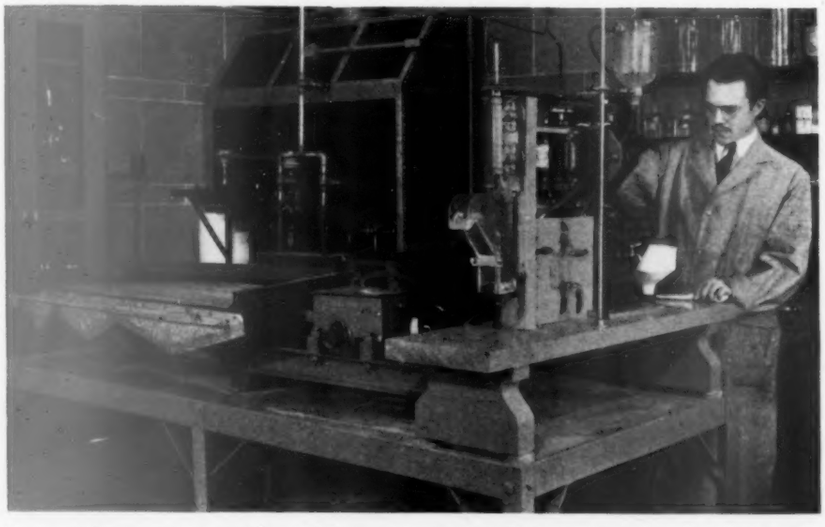
For many years the efforts of the Illinois Geological Survey were directed largely toward cataloging the state's mineral resources indicating their location, extent and character. About 10 years ago, however, the demands of the Illinois mineral industry made it clearly apparent that the industry needed not only information regarding resources but also data regarding how these resources could be utilized to the best advantage for making better products and a greater diversity of products. Under the able guidance of Dr. M. M.

By HARRY F. UTLEY

Chemical laboratory for the analysis of rock and its products.



Equipment for determining the particle-size distribution of rock powders under constant temperature conditions.



Some of the apparatus used in studying means of beneficiating Illinois nonmetallic minerals. To the right of the center is a small flotation cell made of plastics; at the left a miniature concentrating table.

Leighton, chief, the survey has expanded and progressed to meet the demands of industry. The new Natural Resources Building for the first time provides adequate and suitable research facilities.

The research program of the survey relating to stone and its products is of necessity a diverse one because of the variety of the state's resources, which include many kinds of limestones and dolomites, sand and gravel, molding sand, silica sand, fluorspar, tripoli, novaculite, and ganister. The work in progress includes studies of resources and research on the commercial utilization of these resources either singly or in combination.

Dolomite.—Of such nature is the investigation of the weather resistance or soundness of the dolomites in the great stone-producing area in Chicago and the vicinity. This project is designed to provide comparable data regarding the soundness of the various ledges and textural varieties of dolomite found in the area as judged from the results of freezing-and-thawing tests, sodium-sulphate soundness tests and observations of the dolomite in buildings and other structures where it has actually been exposed to the weather for a long period of time. It is intended to provide a basis for the production of a superior stone for use in the trickling-filter beds of sewage-disposal works, and for other purposes requiring dolomite of high soundness.

Though the study is not yet complete, there is strong evidence that the probable soundness of the dolomites may be predicted with reasonable accuracy on the basis of readily evident and easily determinable textural characteristics. The project is coöperative with the Bureau of Materials of the State Division of Highways and the Engineering Experiment Station of the University of Illinois.

High-purity dolomite, low in iron and silica, is an important material as a refractory and for the manufacture of clinkered and dead-burned dolomite used in the steel industry. The Chicago area is the major producing area of these materials in the state, and while evident supplies of high-purity dolomite in the area are adequate for some years, they are not inexhaustible. Therefore, intensive studies were made of other parts of northern Illinois in order to discover additional supplies. The results of this work indicate the presence of an abundance of high-purity dolomite in other parts of northern Illinois.

Fluorspar.—Roughly 90 per cent. of the fluorspar produced in the United States is mined in the Illinois-Kentucky fluorspar district, each of the two states producing about equal amounts of spar. The chief use for this mineral is as flux in open-hearth steel furnaces

and for this purpose about 75 per cent. of the fluorspar normally mined is sold. The activity of the fluorspar industry, therefore, reflects largely the activity of the steel industry and its record has been one of production peaks and lows. In order to provide a less fluctuating market for fluorspar the survey is investigating the uses of the mineral in the chemical field and is attempting to develop new fluorine compounds suitable for use in the chemical industry. The use of fluorine chemicals is a growing one and the research to date is pointing to a number of discoveries of high significance in this field.

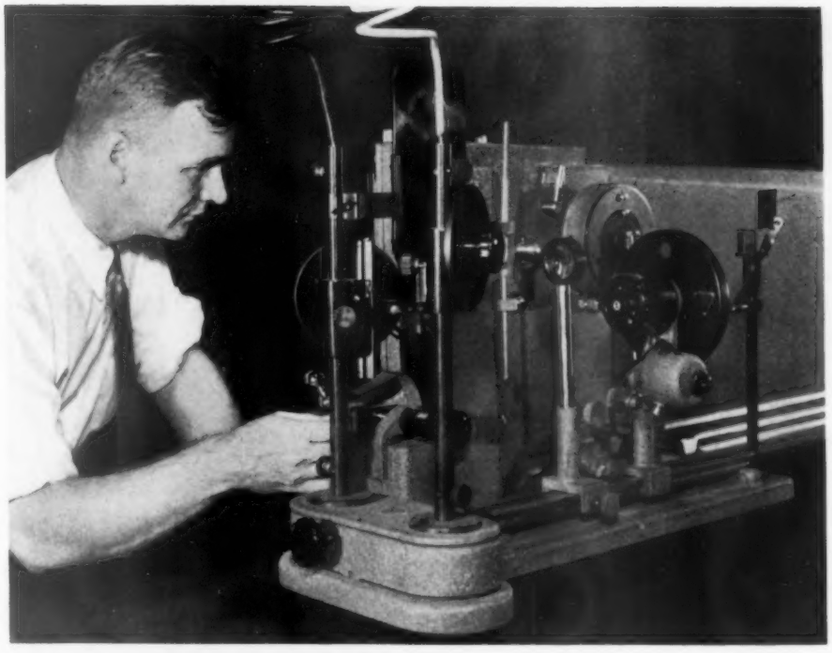
Recent studies of a geological nature in the fluorspar-producing region of the state have resulted in the extension of mining in certain areas and, as a result of this extension, there have been found commercial deposits of lead and zinc which are now being developed.

Agricultural Limestone.—Work on agricultural-limestone resources includes detailed mapping and description of deposits in areas of particular promise from the standpoint of markets as well as direct coöperation in the selection and development of quarry sites with persons seeking to develop new quarries. Assistance is also given to quarry operators seeking to improve the quality of their products. The importance of such work may be judged from the fact that Illinois farmers used over 2,000,000 tons of agricultural limestone in 1940 and an ever-growing industry comprising over 200 quarries is widely distributed throughout the state.

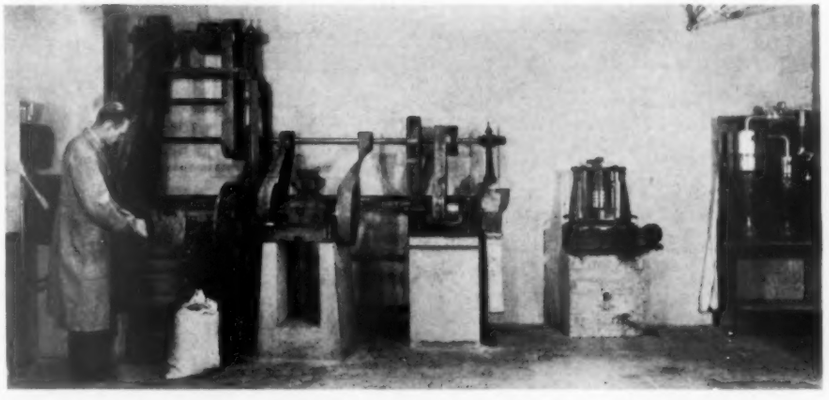
Silica Sand.—Glass is usually made from a mixture of silica sand, limestone, and soda ash with other ingredients. In some of the rocks of Illinois nature has provided a natural mixture of some of these glass-making materials of such character that they fuse to glass. By mixing different rock materials of this kind it is possible to develop a considerable variety of glasses. The possibilities of utilizing Illinois resources along these lines is under investigation, particularly as to the properties and possible uses of the glasses thus produced.

Mineral Wool.—Also being investigated is the viscosity of the glasses resulting from melting Illinois rocks and rock mixtures having suitable compositions for making rock wool and of blast-furnace slags for making slag wool. The temperatures at which viscosity is being studied are those ordinarily employed in the commercial melting of rock and slag in the manufacture of mineral wool. The data which will result from this work form a logical sequel to previous research by the survey wherein the range in composition of materials suitable for making rock wool

(Continued on page 49)



The "business end" of the spectograph employed for the analysis of rock materials especially with regard to their rarer constituents.



The rock-grinding laboratory showing the jaw-crusher, rolls and pulverizer used in preparing materials for analysis and study. To the right of the center are a mechanical shaker screen and an air classifier for sizing the pulverized materials.

One of the modern offices in the building.

Preventing Accidents from Premature Firing of Electrical Quarry Blasts

By P. C. ZIEMKE

MANY and varied are the reports assembled by safety organizations on the accidents that occur by reason of premature firing of electrical blasts. The number of these accidents indicates that serious thought and attention must be given the subject with the end in view of preventing the larger portion of them.

Disregarding the oft-condemned and obviously dangerous malpractices—such as carelessness and indifferent loading methods, which all too often result in accidents regardless of which type of ignition is used—premature firing of electrically fired blasts can be laid to only one cause: inadvertent passage of electric current in volume sufficient to fire a portion or the entire blast.

Usually the cause for such accidents is not long in being discovered when diligent, painstaking effort is applied. Rarely, if ever, are all clues so obscure or difficult to follow that some definite conclusion is not later arrived at and the necessary steps taken to prevent a recurrence.

The currents involved in such premature blasts are easily defined in the following classifications: (1) The premature entry of firing current into the shot-firing circuit; (2) entry of "sneak," or ground, currents into the circuit; (3) a lightning flash.

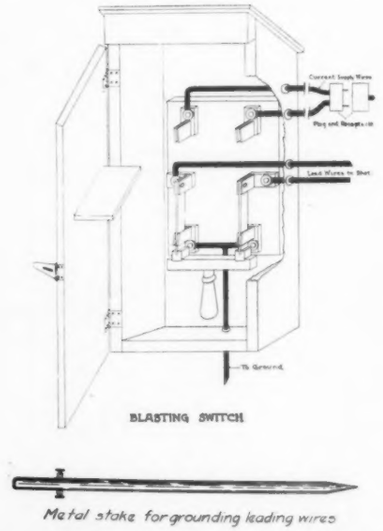
Premature Application of Current.—First we have a situation where through some inadvertant means current is applied to the cap network during loading operations or prior to the area's being cleared of workmen. Usually such accidents are allowed to occur through the non-observance of one or several of the elementary electric blasting rules by those directly in charge of the work. Several suggestions are offered here as precautionary measures.

Where electric current from light or power circuits is used as the firing medium no slipshod methods of attaching blasting-line leads to trolley wires and rails or to other current-carrying parts of cables or switchboards can be permitted. This attachment to a power source must be done through the medium of a safety switch so constructed that the switch can only be thrown "in" after it is unlocked. Still another protective feature that must be included is a means of short-circuiting the blast line by inserting a metal strap across the lower clips of a double-pole, double-throw switch. This strapped out set of lower switch clips is also further safeguarded by connecting them to a tested and effective ground rod by means of a No. 8 gage wire. The connection from the upper switch clips to the power source is best accomplished by the use of a 24-inch section of two-conductor cable provided on each end with the male halves of service plugs.

This cable jumper at blasting time is plugged into a line service plug and the other end is plugged into the service plug attached to the upper switch clips, thereby providing the additional precaution of completly severing the switch from all power during "off" blasting periods and providing a broad air-gap barrier to lightning strokes and line surges which power circuits are commonly exposed to during summer seasons.

An additional refinement of this switch is the placing of a baffle on the upper inside of the door to prevent the closing or locking of it while the switch is in the "up" or firing position. The upper switch clips are partially plugged by "sweating" in pieces of copper strap, thereby preventing such an accident as is described below.

On a large highway relocation project a large blast was completed preparatory to firing it. In addition to getting all the persons off to a safe distance, heavy highway traffic had to be halted and train movements on an adjacent railway line as well. The blaster in charge manipulated the switch when all was clear but the blast remained unexploded although pilot lights indicated that both the protective fuses were intact and that power was available. In the excitment of the moment, with hundreds of eyes centered on him, the exerienced blaster grasped a galvanometer and dashed out to the loaded area to locate a wire break. This he found in short order and as he connected a skipped main connection the entire blast went off with resulting painful injuries to himself. *He had forgotten to pull out the switch from the firing position before he hurried to make repairs.*



Details of safe blasting switch and ground stake.

By inserting the copper strap sections in the upper clips the switch can not be held in the firing position without the sustaining pressure of the blaster's hand. And, what is equally important, the placing of the switch in the down position short-circuits and drains off to ground any accidentally contracted or induced currents present in the lead wire.

On a stump-clearing job, where the licensed blaster was using the dry-cell battery arrangement commonly known as a "hot shot" for a source of power, this blaster merely unhooked or applied one wire end to the battery post in lieu of a switch. On one occasion, when a blast failed to fire upon hooking on the wire end to the battery post, the blaster unhooked the wire, set down the battery, and proceeded to investigate the connections near the loaded stumps. Here he located a break and at the moment he joined two wire ends the charge fired with fatal results. An investigation disclosed that the "hot shot" had tipped over on its side and the battery post had *remade* the connection to the bared wire end.

Several accidents have also been recorded when persons attempted substitution of standard galvanometers with improvised devices of their own making. In the one instance a radio technician had constructed a milliammeter arrangement with a pen-light dry cell installed for power for his blaster friend. This, they claimed, functioned reasonably well for the first few days; later it exploded a single detonator while under test with the resulting loss of several fingers and severe facial lacerations for the blaster.

A hint to the wise lies in the statement that under no circumstances

should a dry cell be substituted for a silver-chloride cell, for even the small pen-light cell is capable of firing a blasting cap. Consequently, should the resistance coils of a galvanometer be short-circuited, as may readily occur under the severe conditions under which they are used, there is every possibility that the dry cell may fire the blasting caps under test.

In this connection let it also be stated that no real economy is practiced in allowing a silver-chloride cell to run down to the extent where the needle moves sluggishly up only half the scale. Such readings can be of practically no value to anyone unless the blast hook-up is of the most elementary nature.

Points of Entry for Stray Current.—Sneak or stray current is of much more common occurrence that is generally recognized. Air-lines, steel structures, ventilating ducts, steam- and water-lines, rails, hoisting ropes and quite frequently ore bodies themselves have been proved to be carrying considerable quantities of current. In most instances, of course, such currents can be directly traced to near electrical equipment, although numerous instances are on record where no electrical machinery was at hand and yet stray current was present in quantities. Sneak currents may enter the shot-firing circuit and detonate the blast prematurely unless precautions are taken to drain off these currents or to eliminate them at their source, thereby keeping them from entering the firing circuit.

Fortunately, these accidents do not occur as frequently as might be the case when more electrical circuits and equipment are used near the scene of the blasting. Operators, too, have learned the care necessary to avoid unintentional contact of firing devices with electrical potentials.

However, since each premature explosion brings to light some peculiar circumstances that caused it, let us analyze several of them. On one occasion in a quarry operation approximately 50,000 pounds of explosives had been loaded, tamped and connected to lead wires preparatory to firing. This lead wire extended several hundred feet along the surface to a blasting machine located in a locked box. Near the toe of the blast 25 men were cleaning up the area as the foreman prepared to sound the "Clear out" warning. In that interval the blast went off and killed those in the path of the big blast.

A subsequent investigation disclosed the cause for the accident, although considerable time elapsed before the logical explanation was arrived at. This is the sequence of events as they occurred. A high-voltage power-line wire of a near circuit fell to earth and failed to trip its protective circuit-breaker because of the highly resistive condition of the dry dirt in contact with the wire. Nevertheless, current in considerable quantities flowed out into the adjoining area. It was this grounded current flowing through and charging the rock strata of the quarry formation that fired the blast prematurely by entering the lead wires and that portion of the leg wires in contact with the damp tamping material or the rock walls of the bore holes.

Applying terminal of wedge bond in rail.

During a particularly severe electrical storm the high voltage fuse on a 33,000-volt mine substation was blown by either a direct hit or a severe line surge. The live end of this fuse sagged and made contact with the rain-soaked cross arm and from that point the current followed the wood substation construction to earth. This high-voltage current flowed out fanwise over a large area through the now highly conductive rain-soaked top soil. Immediately every telephone and telegraph instrument in a ten-block area was rendered useless as the high potential current flowed up the grounding devices of these utilities, to fuse the arrestor contacts and to flow through cables and pole circuits and on to metropolitan central offices. The fuse rupture caused a complete shutdown of all the mining operations while the ensuing quiet and the absence of normal electric power made several interesting tests possible. A voltmeter test across the 10-inch compressed-air main leading underground and the 1,000,000-cm. bare copper negative of the trolley circuit indicated a potential difference of over 800 volts. Electric squibs bridged across both sides of this same trolley circuit fired them at the first instant of contact; here, too, the voltage rose to 500 volts and over.

Underground an electrician was extending the trolley wire into a cross-cut during the power outage. As he accidentally flipped the free end of the trolley wire against an ore vein brilliant sparks and a noticeable arc were produced. Evidently a surface outcropping of the ore vein was conducting a noticeable portion of the stray current underground, where, when it touched other conducting elements of low resistance, it continued on through them. As men walked through the darkened tunnels distinct shocks were felt as they trod on rails and pipe-lines with their hob-nailed shoes. Fortunately no electrical blasts were loaded or in the process of being loaded at the time of the grounding. Thus the hazard of a premature explosion was not present. In this case the proper steps were taken to prevent a recurrence of the incident by installing a rigid type of fuse that could not make contact with the station structure when blown.

While shaft-sinking operations were in progress in a Canadian mine the miners noticed that on several occasions they experienced quite severe shocks when they touched the steel bucket suspended on the hoist cable, even though they stood in rubber footwear. This phenomenon occurred at irregular intervals and no plausible explanation could be advanced until someone recalled that the condition was noticeable only during the first hour of the day. A conference with the switchboard attendant disclosed that he charged the electrolitic lightning arrestor at such times and this unit's ground connection was faulty. In lieu of ground rods, or buried plates directly under the power-house, resort was had to a depression near the power-house where more permanent moisture was assumed to be present. However, the gradual drying up of the low spot went on unnoticed until it no longer served as a low-resistance ground and the high-voltage charging current sought other means of return through the hoist engine frame, the water- and air-lines, etc. Obviously the arrestor equipped with such a ground presented no safeguard against lightning; rather it was a potential hazard, since it could easily serve to conduct lightning strokes underground, which is always a serious condition and doubly so when high explosives are exposed to electric currents. In this instance the hazard was eliminated by sinking an effective ground in a permanently wet swamp some distance beyond the original ground site.

Still another interesting phenomenon is the peculiar galvanic action produced by the presence of large bodies of certain base-metal ores located adjacent to

quarries or present in mines. These particular ore bodies and veins are in themselves capable of producing quite appreciable quantities of electric current and, therefore, account for numerous peculiar manifestations of current in operations totally devoid of electrical power.

Often these ore bodies acting as galvanometric cells have their current potentials increased by the introduction of electrified haulage and mining machinery, in which instance the haulage system usually is the worst offender because of the all-too-prevalent carelessness in maintaining proper rail-joint bonds and return circuits of ample cross-section. To correct such conditions it is of prime importance that a thorough ohmmeter survey be made of all the rail joints and splices in the negative return lines and that protective grounds of a.-c. systems be completely severed from any connection with current-carrying negative lines. Likewise, these a.-c. grounds must be both mechanically and electrically perfect to function properly in times of emergency.

An instance is on record where a corporation, confronted with a serious condition of sneak currents produced jointly by galvanic action and haulage circuits, decided to survey the situation and to install corrective measures to eliminate the threat of premature explosions by draining these currents off. This it accomplished by installing a 1,000,000-cm. bare copper cable from an effective surface ground, thence down to the bottom of the shaft. On each station that pierced an ore body a 4-0 copper lateral was extended to the limits of the deposit and at 200-foot intervals was cross-bonded to rails, air-pipes and water-lines. And wherever a suitable spot presented itself the 4-0 lateral was anchored to the ore body by inserted spuds. On the completion of the work extensive millivoltmeter and milliammeter tests throughout the workings produced only negligible readings, indicating that hazardous potentials were no longer present.

Lightning Hazards. — The term lightning is applied to certain types of heavy electrical discharges in the atmosphere. Within a comparatively recent period its meaning has been extended to include a variety of overvoltage phenomema arising in the operation of electric circuits; however, owing to some confusion the use of this term is not considered desirable.

The principal source of lightning is the well-known summer thunder storm whose terrifying demonstrations of great sound and spectacular discharges are common knowledge. Lightning strokes that occur at such times are by far the most powerful and destructive in their effects. In such cases when a stroke is about to take place the earth for a several-mile-square radius is highly charged electrically. As the discharge takes place this surface charge moves radially toward the ground end of the air path, forming an electric current in the earth. Near the point where the discharge enters the ground the current density becomes high and may easily cause explosives to detonate by the heat and shock present at such times.

Streak lightning is the type with which we will concern ourselves since it is the only kind productive of effects harmful to the quarry industry. This streak lightning appears to have a white, pink or bluish tinge path of a diameter apparently varying from an inch to a foot and of a length which may vary from a fraction of a mile to several miles. This streak lightning when it branches into several sections is also known as forked lightning and is fully capable of striking objects considerable distances from each other simultaneously. Streak lightning causes by far the greatest damage of all the various types of lightning known since the voltage and amperage produced are enormous.

The adage that lightning does not strike in the same place twice is well refuted by the fact that the Empire State Building was struck 92 times in four years, the largest bolt having been estimated at 22 000 amperes in volume. While direct strokes to unprotected structures and electrical apparatus are usually severely destructive, these same strokes, even though they do not directly strike a vulnerable spot, may readily set up serious induced currents.

Making final connections of detonator leg wires underground.

These currents are produced by either electromagnetic induction, electrostatic induction, or both, depending on the conditions. In comparison with the electrostatic effect, electromagnetic induction by lightning is generally negligible.

On high-voltage lines the insulation values may be high enough to prevent outages by induction and most of the outages may be caused by direct strokes. On low-voltage lines, such as quarry and mine operators are principally concerned with, outages may be caused by both induction and direct strokes with most of the outages caused by induction.

A charged cloud causes an electrostatic field between it and the earth. Part of the field will terminate on any transmission line within the field of influence of the cloud and the line is then recognized as having a "bound charge." This "bound charge" is of a polarity opposite to that of the cloud, the charge of the same polarity being driven off to the earth by leakage paths along the line or through the terminal equipment or to a remote portion of the line beyond the cloud's field. When the voltage of the cloud becomes high enough a lightning flash will occur. Though this flash may occur at a considerable distance from the line, the potential developed on the line will be released and the resulting action is that the insulated line rises from the earth potential to a high value with a polarity opposite to that of the cloud. The resulting effect is that a voltage is applied between the line and the ground. The field that extended between the line and the cloud is then succeeded by one between the line and the ground. The resulting voltage wave travels over the line at the velocity of light. In those instances where the insulation values are sufficiently high so as to withstand these destructive surges they usually travel to the power-house or distributing station to break down apparatus or to be discharged to ground where proper arrestor equipment is provided.

On overhead transmission lines the induced voltages often reach high values 1.200 to 1,600 kv. being frequently recorded. When these induced voltages are produced on low-voltage circuits much trouble may result from the spark-over that occurs at the insulators, which in turn is often aggravated by the power arc-over which frequently completes the destruction. This condition can only be corrected by the installation of sensitive relay-operated tripping-out apparatus.

A recent survey of premature electrical blasts initiated by lightning indicates that in shaft-sinking operations alone six fatalities occurred in three accidents in a period of eight years. An

interesting fact noted from the evidence presented by these accidents indicates that they possess points of similarity.

A fact of primary importance is that in no instance were the blast lead wires connected to the detonator network at the time of the premature firings; thus premature application of the firing current or infiltration from adjacent lines must be eliminated as possible causes.

Also worthy of mention is the fact that in all cases the steel skip or bucket was suspended either at or near the bottom of the shaft at the time of the blast and in all three instances lightning was known to have struck the surface area at the moment of the explosion.

These facts prove quite conclusively that in all probability these accidents were caused by the proximity of the steel hoist rope and bucket to current-conducting elements, such as wet timber, pipe-lines and metallic-ore seams present in the rock; these in turn led the current into the detonator network. It is not to be assumed that the lightning necessarily struck the hoist rope, the head frame, or the hoist building, since the foregoing paragraphs have explained the peculiar charged condition that exists in the earth just prior to the moment, and at the instant when, a bolt strikes. Thus, it is also quite possible that a considerable current was induced in the steel hoist rope by the proximity of a heavily charged cloud; this potential in the rope was then released as the lightning flashed and this current found contact with the earth through numerous elements in the shaft, the detonator circuit included.

Several other plausible explanations may be considered. In one instance the direct-current underground trolley feeder showed indications of having been subjected to a very severe voltage surge induced by the lightning bolt. It is entirely possible that this surge, as it discharged through the rails, pipes and ore seams, also flowed into the detonator circuit and caused the explosion. It is also reasonable to assume that the heavily charged condition of the surface stratum and its buried conductors, such as the various pipe-lines and electric cables, when released at the instant of the lightning flash flowed underground and transmitted to the blasting circuit a potential of sufficient intensity to fire it.

A final explanation is offered in the supposition that the blasting lead line, paralleling the steel hoist cable, had current induced in it in a volume sufficient to leap the opening at its lower extremity as the voltage surge reached its highest gradient.

Peculiar Characteristics of Detonators.—By way of illustrating the interesting phenomena of unusual electric-current effects on detonators the author recalls a premature explosion that occurred in a quarry where upward of 300 wagon-drill holes were loaded and wired as a thunderstorm approached. The chief blaster stopped all loading operations and ordered the men and equipment removed from the scene. Hardly had they reached a place of safety when a bolt of lightning struck in the immediate vicinity and simultaneously several holes exploded. Upon entering the loaded area later an interesting condition was disclosed; only the extremities of each individual series had fired. Evidently the completed network of series-parallel connected detonators had by induction become so charged by the proximity of the storm cloud, or the subsequent lightning flash, that an insulation breakdown occurred at points where the current escaped to the ground—in this instance the end holes.

Lightning discharge to a sandy beach.

The path of least resistance in this instance was along the leg wires to the ground through the several insulation breaks and by arcing across from the detonator filament to the copper shell. It was this arcing from the bridge wire to the shell that exploded the end detonator and in turn fired the hole. Numerous shop tests subsequently proved the above theory to be worthy of acceptance, since detonators fastened in a steel mortar fired quite uniformly when current of from 600 to 700 volts potential was applied to one leg wire and the mortar's surface.

Another interesting incident occurred on a project where approximately 125 holes were loaded and wired in individual series in groups of 25. The blaster's method, during the period the regular blasting service was being moved, was to pull a single-bladed light service switch and connect the blast lead wires to the lower binding posts; then, as the lights were thrown on, the blast was fired. However, on this occasion as the first wire of the blast line was touched to the negative and grounded binding post of the switch, the first hole connected on the line exploded and ruined the circuit for the time being. An investigation disclosed that a difference of potential existed between the grounded neutral and a rod dropped in a water-filled drill hole. The cause for this lay in the fact that the lighting system's ground rod had been driven into the dry gravel tamping material used to set the light service pole and therefore offered a high resistance to currents seeking entrance to the ground. From the foregoing it can be ascertained that no advantage is had by the non-connecting of the detonators to the lead wire as an assurance of safety during electrical storms.

Numerous instances have also been recorded where detonators left unconnected exploded coincidentally with a nearby discharge of lightning. Usually, however, in such instances no complete detonation of the entire blast results, rather only holes scattered at random about the loaded area. The explanation for this probably is that detonator filaments vary considerably in cross-section and, therefore, in sensitivity to an electric current. Thus, some filaments are instantly heated to the exploding point while others of higher resistance are merely warmed as the stray current flashes through them for an infinitesimal period of time.

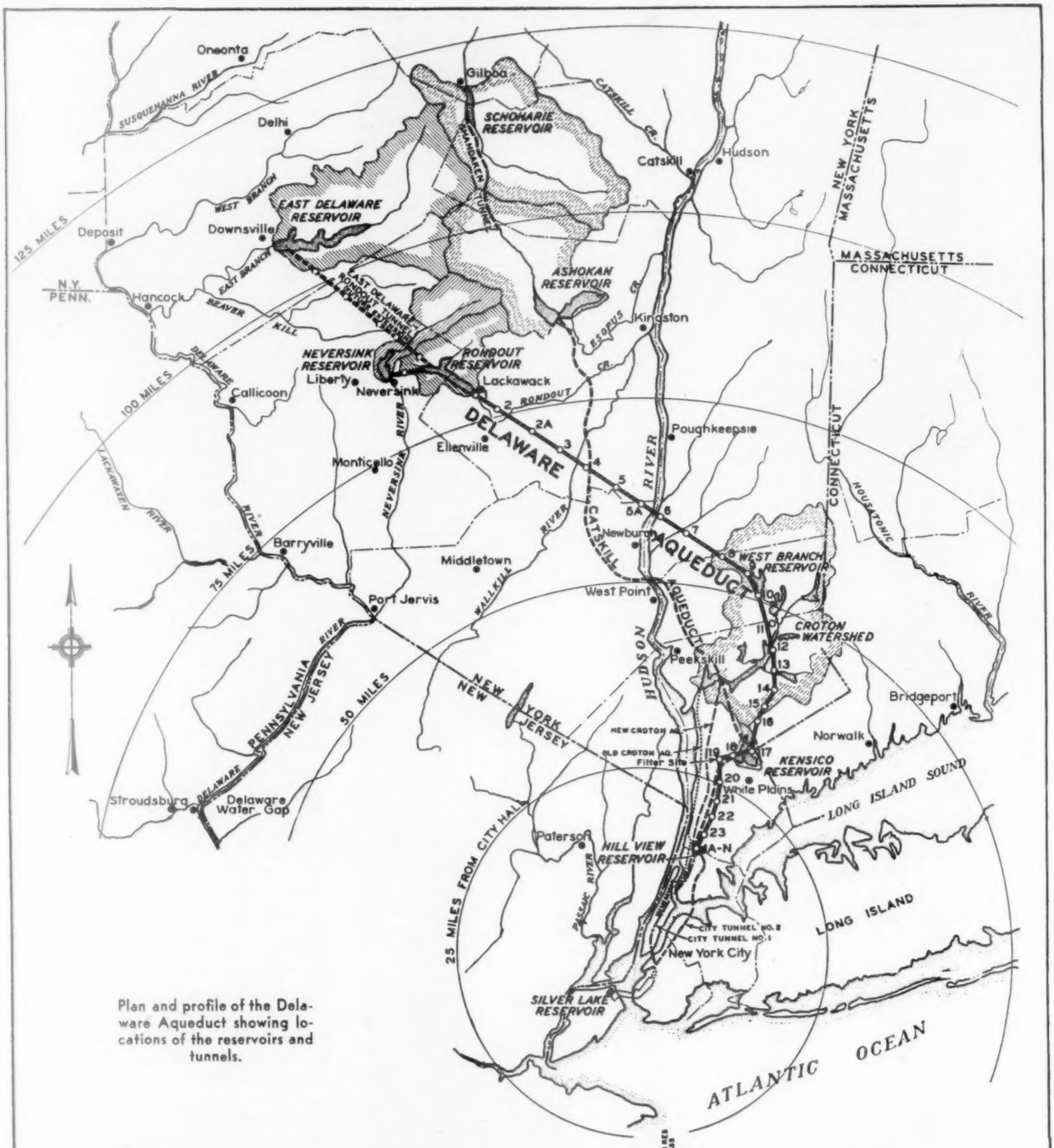
As is the case with detonator circuits interconnected, individual unconnected holes fired prematurely as lightning strokes occur are also influenced by induced currents that are set up in the leg wires projecting beyond the drill holes. These currents then flow downward to enter the earth through insulation breaks or by arcing to the shell.

Briefly summarized, several fundamental rules should be observed to minimize the frequency with which electrical blasts are fired prematurely:

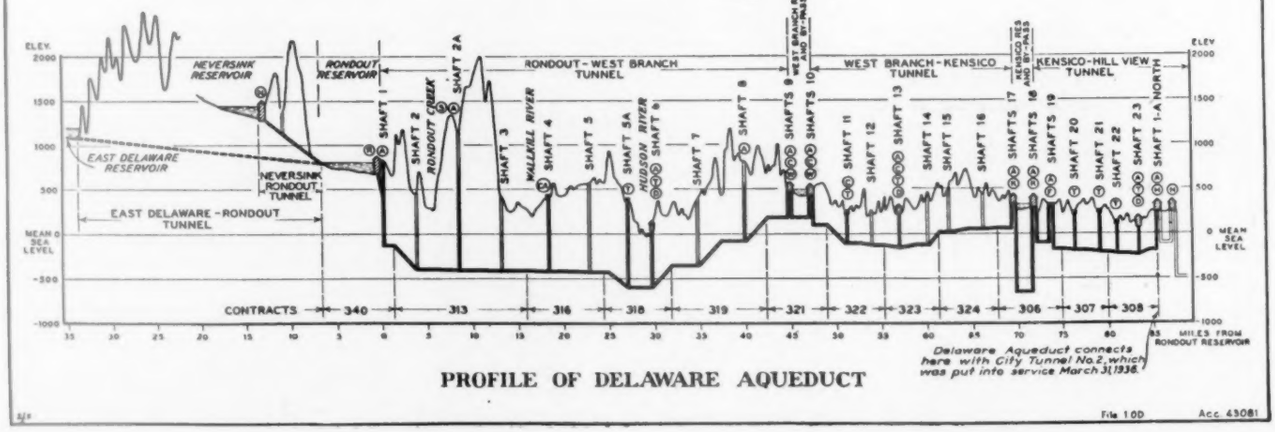
1. The interconnected detonators or blast circuit should remain disconnected from the lead wires by an appreciable gap until the last moment of firing, and at all times be kept from contacting either directly or indirectly any signal or light and power lines, and all lines that may act as conductors for stray currents, such as rails, steel timbering, pipe-lines, hoist cables and streams of alkaline or acid water.

2. The lead wires extending to the explosive-loaded area should be so planned that sectionalizing switches may open long runs at intervals and to short-circuit and ground these sections through these same switches located at such safe distances that, should a pre-

(Continued on page 42)



Plan and profile of the Delaware Aqueduct showing locations of the reservoirs and tunnels.



PROFILE OF DELAWARE AQUEDUCT

File 10D Acc. 43081

AGGREGATES for DELAWARE AQUEDUCT

Sand-and-gravel plant of Samuel R. Rosoff, Ltd. near Wawarsing.

THE Delaware Aqueduct, which will add materially to the water supply of New York City and its vicinity, takes its place among the world's greatest engineering and construction achievements. This 85-mile aqueduct varies from 13½ to 19½ feet in the interior diameter of its concrete lining. It has 31 shafts which vary in depth from 313 to 1,551 feet with an average depth of 623 feet. When completed, together with its southern extension, City Tunnel No. 2, it will be a continuous deep pressure tunnel in rock 105 miles in length, the longest ever built. This aqueduct will bring to New York City 100,000,000 gallons of water daily from the Rondout Reservoir and 70,000,000 gallons from the Neversink Reservoir. Later, when a 26-mile aqueduct is built to the East Delaware Reservoir on the East branch of the Delaware River, vast additional quantities will be available. The Rondout Reservoir is on the Hudson River side of the Catskills about 85 miles north of New York City and the Neversink Reservoir is about 8 miles farther west in the Delaware River watershed.

By W. E. TRAUFFER

The Delaware Aqueduct consists of three principal sections:

(a) The Rondout-West Branch tunnel, about 45 miles in length and 13½ feet in diameter, connecting the Rondout Reservoir with the West Branch Reservoir of the Croton system.

(b) The West-Branch-Kensica tunnel, 27.1 miles in length and 15 feet in diameter, between the West Branch

The Dravo operations. Whirley crane at left distributes finished stone to storage.

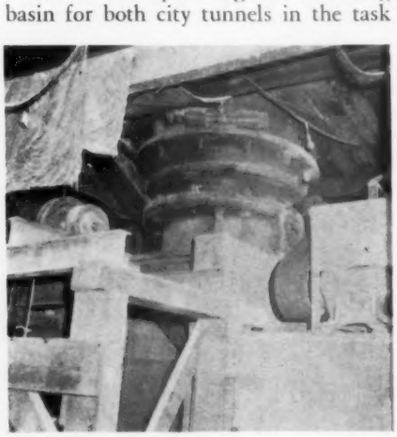
The Dravo sand plant as seen from the stock-piling conveyor. Cones and dewatering conveyor at the right.

Reservoir and the Kensico Reservoir of the Catskill system.

(c) The Kensico-Hill View tunnel, 13.7 miles in length and 19½ feet in diameter, connecting the Kensico Reservoir with the Hill View Reservoir, which is the terminus of the Catskill Aqueduct and the feeding point of both the present city tunnels, No. 1 and No. 2.

The Rondout Reservoir, which forms the beginning of the main aqueduct, will collect water not only from its own watershed but will also receive the waters from the Neversink and East Delaware reservoirs. The Rondout-West Branch section of the tunnel feeds the West Branch reservoir which, because of its high elevation, makes it possible to divert by gravity some of the Croton waters into the Delaware Aqueduct. The Kensico Reservoir at the terminus of the second section of the tunnel, will serve as the main distributing reservoir of the Catskill and Delaware supplies and will store enough water to care for the wants of the city for a month or more if the aqueducts to the north should for any reason be shut down. The terminus of this system is at the Hill View Reservoir in Yonkers, which will continue to serve as an equalizing or balancing basin for both city tunnels in the task of delivering large volumes of water to the complicated distribution system of the city.

Apron feeder and grizzly which by-passes 6-inch stone around the gyratory crusher.



Another view of the gyratory crusher in the Dravo crushed-stone plant.

Under normal conditions the water from the Rondout-West Branch tunnel will pass through the West Branch Reservoir and in the same way through the Kensico Reservoir in order to get the benefits resulting from the deep storage of water. By-pass tunnels under both reservoirs can be used if, for any reason, it is considered inadvisable to mingle the supplies from the two main sources.

Several million tons of aggregates will be required for the concreting of the tunnel lining and for other incidental concrete work. As in most similar projects, each contractor selected his own source of aggregate supply subject to the approval of the City of New York Board of Water Supply. On certain sections of the aqueduct the stone excavated from the tunnel and shafts was suitable and was processed for use in the concrete in temporary plants operated by the contractors. In other sections, notably west of the Hudson River, the excavated rock was not suitable for such use, and the contractors either produced their own sand and gravel or bought it from established local producers. The Windsor Builders' Supply Company and the Cornwall Sand & Stone Company at Newburgh, New York were among the producers who supplied aggregates to contractors on this section of the project.

Contract 313, awarded to Samuel R. Rosoff, Ltd., consists of 75,100 feet of 13½-foot tunnel extending from about midway between Shafts 1 and 2 to be-

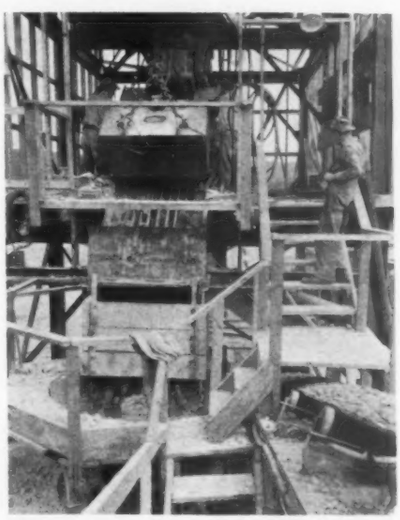
Reduction crusher under the scalping screen in the Dravo stone plant.

tween Shafts 3 and 4 (see the map on page 36). The sand and gravel aggregates for this contract are being supplied by a new 300-ton per hour plant at Kerhonkson, New York, which is operated by the Rosoff Sand & Gravel Company. This plant was designed by the Smith Engineering Works, which also supplied most of the equipment, including seven vibrating screens, two feeders, two crushers, two scrubbers and six belt-conveyors. The finished aggregates are stored in a 1,500-cubic yard, 3-compartment Blaw-Knox steel bin.

The S. A. Healy Company had Contract 307 for 26,820 feet of 19½-foot

tunnel through Shafts 20 and 21 and is now completing Contract 324 for 37,100 feet of 15-foot tunnel and Shafts 15 and 16. The gravel for these contracts was supplied by a 50-cubic yard per hour temporary gravel plant operated by the New York Trap Rock Corporation near its Verplanck, New York, crushed-stone plant.

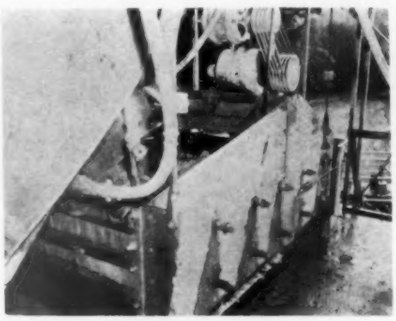
An established producer of ready-mixed concrete also shared in this business. Associated Contractors, Inc., a combination of the Henry J. Kaiser and Tom Walsh interests, has Contract 306 for 18,850 feet of 15-foot tunnel, 16,030 feet of 19½-foot tunnel and influent, coagulating, effluent and aëration works at the Kensico Reservoir.



Scalping screen in the Dravo stone plant. The magnet suspended over the screen removes tramp iron.

The tunnel involved extends from shaft 17 to 19, and beyond in both directions. The McCormack Transit Mix Concrete Company of New York City built a 250-cubic yard per hour batching plant to supply the more than 400,000 cubic yards of concrete required for this contract. Concreting was begun in March, 1940 and is expected to be completed by March, 1942. The batching plant, known as the Valhalla plant, is located about 4 miles north of White Plains, New York. As many as 18 truck-mixers have been used at this plant during periods of "peak" demand. Aggregates were obtained from the company's regular commercial sources of supply and were hauled to the plant in trucks from a dock at Port Chester 11½ miles from the plant.

One of the largest straight tunnel contracts on the aqueduct is Contract 319 held by the Dravo Corporation, which is working on 55,900 feet of 13½-foot tunnel through Shafts 7 and 8. The stone excavated from these shafts is chiefly gneiss which has a high quartz content and passes all tests. A crushed-stone plant was put in operation at Shaft 7 in April 1941 and operated there until July. The sized stone was stock-piled and is being used in a concrete plant which is supplying that part of the project accessible from that shaft. After 76,000 tons of stone was produced at that location the crushing plant was dismantled and set up at Shaft 8, where it went into operation on August 15. The concrete plant at this location only recently started operating. At this shaft 280,000



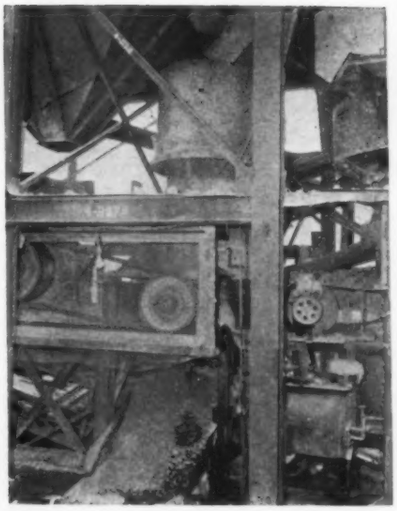
Material over 4-mesh in size is removed by this double-deck screen in the Dravo sand-and-gravel plant.

tons of crushed stone will be required.

The crushing plant was designed for a capacity of 200 tons per hour and at its first location actually produced as much as 2,500 tons per day in two 8-hour shifts. About the same capacity is being obtained at Shaft 8.

The stone excavated from the tunnel is brought up the 970-foot shaft in two 5-cubic yard balanced skip buckets. These discharge the stone into separate hoppers. Trucks loaded at these hoppers carry the stone to the plant when it is operating or to stock-piles. as work in the tunnels goes on 24 hours per day.

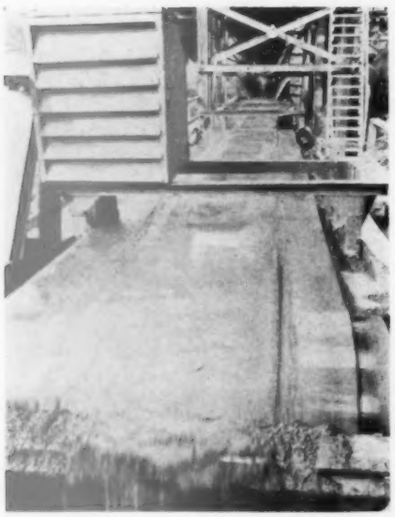
The stone for the plant is discharged from the trucks on a Telsmith apron-feeder over a sloping-bar grizzly. Sus-



Gyratory crusher which reduces intermediate sizes rejected by the scalping screen above. (Dravo crushed-stone plant.)

pended rails slow down the speed of the large rock going to the Telsmith 20-B primary gyratory crusher. The minus 6-inch grizzly "throughs" and the crusher product are both discharged on a 30-inch by 250-foot inclined belt-conveyor running to the plant level. An Electric Controller suspended-type magnet over the head pulley of this conveyor removes all the iron present before the stone is discharged on a 30-inch by 150-foot inclined belt-conveyor which runs at right angles to a 30-cubic yard surge bin. A Jeffrey-Traylor 30-by 72-inch electric vibrating feeder discharges the stone from this bin on a 24-inch by 80-foot belt-conveyor feeding an Allis-Chalmers Low Head screen. This has 3-, 1½-, and ¼-inch openings on its three decks. The plus 3-inch rock drops into a Traylor Type Y gyratory reduction crusher. The 1½- to 3-inch rock off the middle deck drops into an Allis-Chalmers Number 636 Type R gyratory crusher which is

Washer which recovers solids from waste flumed away from the Dravo stone operations.



Concave-convex conveyor which dewaters sand.

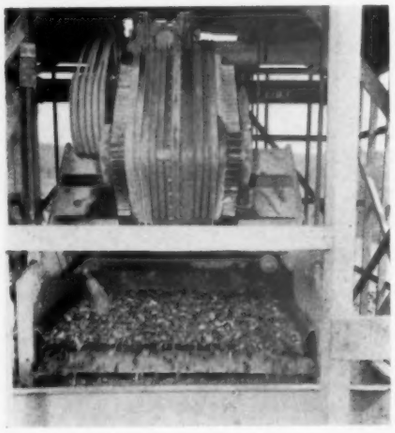
equipped with a hydraulic system allowing adjustment of the opening to be made while in operation. The products of both crushers are discharged on a short 24-inch belt-conveyor feeding back to the conveyor ahead of the surge bin.

The ¼- to 1½-inch material off the bottom deck of this screen is carried on a 24-inch inclined belt-conveyor to an Allis-Chalmers 2-deck Low Head washing screen. This makes ½- to ¾- and ¾- to 1½-inch products which are discharged into stock-piles.

The minus ¼-inch material passing through the bottom deck is flumed to a Dorr 9-foot diameter sand washer. This machine operates at a speed of 2½ r.p.m. and removes the solids from the waste water before it is discharged into the pond which serves as the wash-water supply for the plant.

The two sizes of gravel in the stock-piles are distributed by a 1½-cubic yard Dravo whirley mounted on piling. Temporarily the stone is loaded into trucks and hauled to the concrete plant, but a conveyor to take any desired size from the washing screen to the concrete plant as needed will be installed.

The sand for the Dravo contract is supplied by a plant located near Shaft 7. Although this plant is only a few miles from Shaft 7 as the crow flies, the haul by road is long because of the

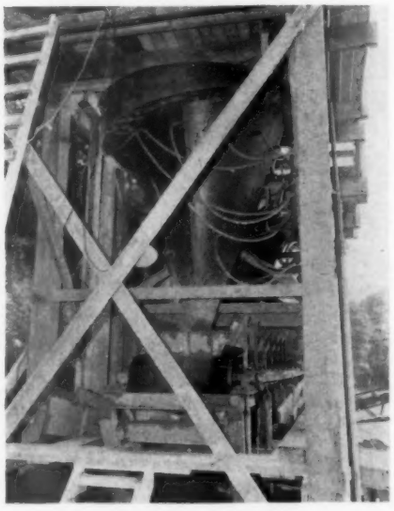


This double-deck washing screen makes the final separation at the Dravo crushing plant.

mountainous country and the fact that there are no direct roads connecting the two points. For this reason a rather unorthodox system of haulage, which has solved the problem, was worked out. The sand is discharged from the plant into a 10-inch pipe through which it drops 400 feet to the tunnel level. This pipe is facetiously called Shaft 7½. In the tunnel is a bin from which the sand is loaded into cars. These are hauled by locomotives a distance of 11,300 feet to Shaft 8 where the skip hoist used for rock is also used for the sand. The cars, locomotives and tracks are also the same as those used for rock haulage when the tunnel was being driven.

The sand is discharged from the skip buckets into a hopper from which a 24-inch belt-conveyor feeds it to a Barber-Greene pivoted stacking belt-conveyor. A Dravo whirley is used to distribute the sand in the stock-pile and to transfer it to the concrete-plant bins.

The sand pit is located 2½ miles from the sand plant and the material taken from it is hauled in trucks, which discharge over a grizzly into a 50-ton bin. A 24- by 72-inch Jeffrey-Traylor electric vibrating screen feeds the material on a belt-conveyor to the Allis-Chalmers 2-deck Low Head screen. This removes the gravel, which averages about 22 per cent. of the total material, and discharges it on a 26-foot belt-conveyor leading to a bin from which trucks haul it to waste.



Sand cone and dewatering belt. (Dravo sand-and-gravel plant)

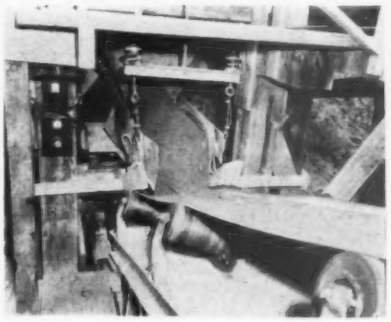
Electric vibrating feeder beneath surge bin at the Dravo crushing plant.

The sand passing through the top deck of the screen is flumed with the wash water into two Kennedy-Van Saun 8- and 6-foot diameter sand cones which are placed in series but can be used separately if desired. The finished sand is discharged from both tanks on a Kennedy-Van Saun 36-inch by 70-foot dewatering belt-conveyor, which is of a type that has been described in detail in past issues of PIT AND QUARRY. Briefly, it is a conveyor which is concave at the feed end and gradually flattens out and then becomes convex near its discharge end. This allows gradual drainage of the water from the sand without the loss of the fine sand. The dewatered sand is discharged by the dewatering conveyor on a 24-inch wide Barber-Greene stock-piling belt-conveyor, which is pivoted to distribute the sand over a storage tunnel. A reclaiming belt-conveyor feeds the sand

into the pipe to the tunnel which has already been described.

The current for the individual plant motors is supplied by a Caterpillar 13-66 Diesel-generator set.

The operations of the Frazier-Davis Construction Company are located at Shaft Number 9 of the aqueduct, on Route 301 near Carmel, New York.



Vibrating feeder under Dravo gravel-plant truck hopper.

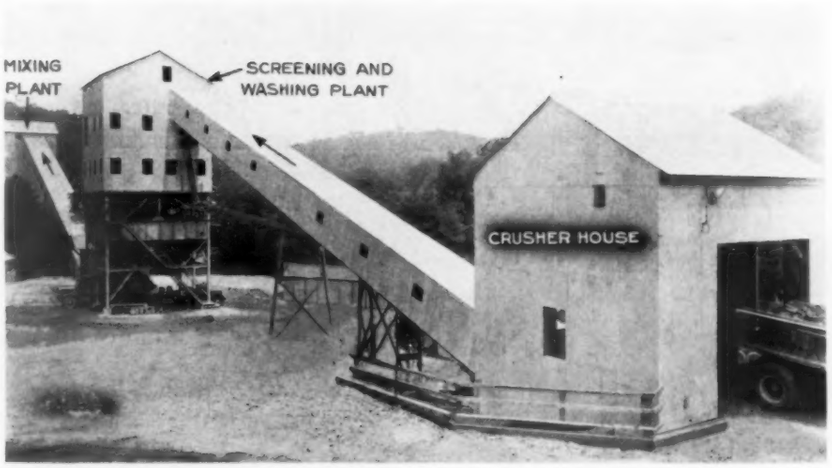
The trap rock is brought out of the shaft in skip buckets and is discharged into a bin. Trucks haul the stone several hundred feet to the crushed-stone plant, where it is dumped from a ramp through a chute to the primary crusher. The rate of feed to the jaw crusher is regulated by means of a hinged apron at the bottom of the chute. Air cylinders on each side of the apron raise or lower it as desired. When raised

One of the screens in the Seaboard plant.

completely, this apron shuts off the feed.

The 24- by 36-inch jaw crusher is an old model which had no provision for water cooling around the bearings. A metal box has been built around them. Cooling water enters this box through four hoses and leaves through a fifth.

The crushed stone is discharged on a 26-inch by 85-foot belt-conveyor which feeds a Link-Belt 3-deck vibrating



The Seaboard plant showing conveyors leading from crusher house to screening building and mixing plant.

screen equipped with sprays. Two sizes of stone, 1½- and ¾-inch, are discharged into bins. The screenings (minus ¼-inch) are discharged into a separate bin from which they are trucked to waste. The plus 1½-inch stone is chuted into a 2-foot, 4-inch Traylor Type V gyratory crusher. A short 20-inch belt-conveyor feeds this stone back to the main belt-conveyor.

This plant went into operation in August, 1940 and the production of the 200,000 cubic yards of crushed stone required for this contract will be completed soon. Its "peak" output has been 18,000 cubic yards in 24 hours. This company has Contract 321 for 11,900 feet of 13½-foot tunnel and 23,100 feet of 15-foot tunningextending from halfway between Shafts 8 and 9 to halfway between Shafts 10 and 11. The influent and effluent chambers for the West Branch Reservoir are also included. Concreting of this section of the tunnel is expected to be completed by early December, but other incidental work will follow. About 50,000 cubic yards of sized stone has been stock-piled so that concreting operations can be carried on after the plant is shut down.

The C. S. Johnson concrete-mixing plant at Shaft 9 has three Ransome 1-cubic yard mixers. The concrete is chuted to a hopper in the tunnel, which is 400 feet below the surface at this point, and is delivered to the point of pour by cars and locomotives. This concrete plant was originally located at Shaft 10 and stone was hauled to it from the crushing plant in trucks. Sand is hauled in trucks from a pit near Bedford.

One of the first contracts to be completed was that of the Seaboard Construction Company at Shaft Number 13 near Katonah, New York. This Contract, Number 323, consisted of 30,600 feet of 15-foot diameter tunnel and Shafts 13 and 14. Sinking of the shafts was begun in May, 1938 and the tunnel excavation was completed May 15, 1940. Crushing of the 140,000 cubic yards of rock for this contract was be-

The plant of the Frazier-Davis Construction Company at Shaft 9.

gun on June 4, 1940 and was completed on January 14, 1941. Concreting was completed a few months afterward.

This section of the tunnel is mainly in Fordham gneiss, a hard, fine-grained rock well suited for a concrete aggregate. The rock was brought up from the tunnel at Shafts 13 and 14 where it was stock-piled. The crushing plant produced the required amount of stone for the tunnel from the pile at Shaft 13 and was then moved a few miles south to Shaft 14 near Bedford Village, where it is now crushing the stone stock-piled there for sale. The plant has a capacity of about 100 cubic yards per hour and in its original location was operated two and three shifts daily.

The rock from the muck piles was loaded by a 1¾-cubic yard Bucyrus-Erie Diesel shovel into 5-cubic yard Mack trucks which hauled it to the plant. The Allis-Chalmers Number 8 Gates primary gyratory crusher was followed by a 30-inch by 200-foot inclined belt-conveyor which discharged the stone at the top of the plant into a 5- by 15½-foot Stephens-Adamson combination scrubber and scalping screen. The plus 1½-inch oversize dropped into a 7-inch Allis-Chalmers Newhouse crusher and was returned to the top of the plant by a bucket-elevator.

The minus 1½-inch stone and water flowed on a 4- by 10-foot Stephens-Adamson triple-deck vibrating screen equipped with sprays. The two finished sizes of crushed stone—1½- and ¾-inch—dropped into bins. The minus ¼-inch material and water flowed into a screw washer with two 20-inch by 18-foot screws. The dewatered material dropped into another bin. The four steel bins have a capacity of 500 tons each.

Frazier-Davis engineers designed this water-cooling system for the plant's primary crusher.

A 30-inch by 36-foot belt-conveyor carries the materials from these bins to the feed hopper of the mixing plant. This hopper had one compartment for sand and stone which were carried to the top of the plant on a 34-inch by 250-foot inclined belt-conveyor. The other compartment was used for bulk cement which was carried to its plant bin on a 20-inch by 250-foot belt-conveyor. These conveyors were inclosed in the same steel gallery. The aggregates were discharged into separate bins with a total capacity of 260 cubic yards and the cement into a 900-barrel bin over the two 2-cubic yard Smith mixers.

Chute with air-operated gates which regulate feed to the Frazier-Davis primary crusher.

The concrete was discharged through a 10-inch pipe into a hopper over the tunnel from which it was conveyed to the Chain Belt Rex Pumpcrete machines in 4-cubic yard Blaw-Knox agitator bodies mounted on cars.

All the equipment in both plants except the crushers was furnished by the Stephens-Adamson Manufacturing Company, and all the motors by the General Electric Company. The plants were designed and built under the direction of J. C. Buckbee, consulting engineer for the Seaboard Construction Company, in association with Arthur A. McLaren, chief engineer.

The Utah Construction Company had Contract 322, which consisted of 33,400 feet of 15-foot diameter tunnel and Shafts 11 and 12. A crushing plant was operated at Shaft 11 to process the excavated rock. Two sizes, 1½- to ¾-inch and ¾- to ¼-inch, were produced at the rate of 750 cubic yards in 8 hours. Sand was supplied by the Worden Sand & Gravel Company from its plant near Katonah, 5 miles distant.

The cement and aggregates were batched with C. S. Johnson equipment and the batches were discharged through pipes to hoppers at the bottom of the shaft. There the ingredients were discharged into 1-cubic yard containers on flat cars to be hauled to the mixer at the point of pour. A Press-Weld pneumatic placer was used to place the concrete in the forms.

Premature Firing (from page 35)

mature explosion occur as a switch is manipulated, no one will be injured.

3. Wherever lead wires closely parallel, cross or contact, such conductors as rails, pipes, steel timbering and ventilating ducts, these conductors should be securely cross-bonded at intervals and periodically checked with proper volt and ampere meters to assure their continued safe condition by indicating no difference in potential.

4. Large bodies of base-metal ores, if they indicate a tendency to produce potentials by galvanometric action, should be neutralized by electrically connecting them to a well-constructed ground system, such as a properly-bonded haulage system, pipe-lines, or a special copper cable.

5. All current-carrying lines should be prevented from contacting any other line which might cause abnormal currents to flow or provide a path for stray currents.

6. Keep protective ground connections of all a.-c. equipment completely segregated from trolley-circuit negative lines, otherwise an accidental opening of the trolley negative may easily cause serious damage to the a.-c. equipment. Especially is this true where the metal sheath of a.-c. feeders is maintained contiguous to substation or surface and used as a ground line.

Briefly stated, the above rules must be rigidly enforced to minimize premature explosions in electrical blasting as far as man-made current is concerned. However, it should be fully realized that none of these rules will prevent premature explosions as caused by lightning and its attendant effects, for lightning strikes with such intensity and all-pervading power that no conceivable precaution can assure immunity from danger, *unless loading activities are halted and men are removed during the occurrence of an electrical storm.*

In those instances where the risk of a direct hit must be assumed some safety attaches to the use of the old familiar time-fuse method of ignition since by its use no electrical detonators are involved; however, for the larger blasts ignition by a time fuse does not readily lend itself to efficient work.

For the "must" type of shooting that requires doing irrespective of electrical hazards a valuable addition to blasting technique is the use of detonating fuse, either of the lead- or fabric-covered variety. This fuse is highly recommended for the major shots since no electrical circuit need be employed, the initiating percussion being furnished by a length of time fuse and a crimped-on detonator.

Automatic Scales Simplify Manufacture of Masonry or Other Special Cements

By C. H. SONNTAG
Consulting Engineer

FOR a long time there has been a demand by brick and stone masons for something that would make a mortar with properties intermediate between those of straight-lime and straight-Portland cement mortars. These men want a mortar stronger than one made of lime and sand only, but with the same adhesion or "suction" to brick or stone. It need not be as strong as a mortar made of Portland cement and sand only, but should be far more plastic or "buttery," and work smoothly under the trowel. If, in addition, it will harden and remain hard in the presence of moisture or even under water, so much the better. It is important that the mortar be non-staining; that is, no discoloration of the stone-work should result from its use.

In Europe several grades of impure or "hydraulic" lime are on the market, and some of these will make a fair masonry cement when mixed with sand, but hydraulic lime has never made an important place for itself in this country.

It is logical that the manufacture of such a distinctive article as masonry cement should be undertaken by existing cement makers, because they already have the mechanical equipment, operating skill and selling organizations, and in recent years have had spare plant capacity. So it has come about that there are quite a number of masonry cements on the market, most of them made in Portland-cement mills.

Manufacturers went into the masonry-cement business in a groping sort of way, trying to meet the desired characteristics at a price that the purchaser could afford to pay. Eventually most makers have found that strength may be best insured by the use of a considerable proportion of Portland cement, while plasticity, spreading power, "trowelability" or "butteriness" may be obtained through the use of hydrated lime. Hence, most, but by no means all, masonry cements consist basically of a mixture of these two substances. But "butteriness" may be had without the use of hydrated lime by the addition of so-called "plasticizers" in small quantity, while substances may be introduced which offer the possibility of pozzuolanic action with lime, either that originally present or that resulting from the hydration of the Portland cement.

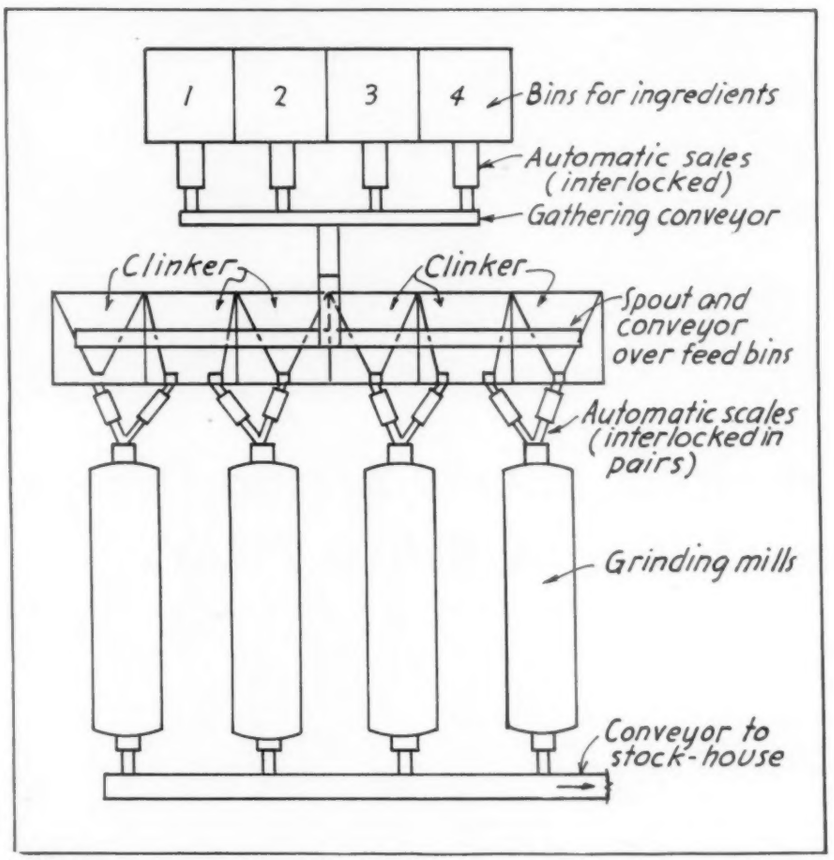


FIGURE 1.

The manufacture of masonry cement is now emerging from the early arbitrary cut-and-try period, and is becoming a recognized and established industry, so that, at least as regards any one producer, its technology has become relatively stabilized. Accurate cost-keeping is a part of that stabilization, and should include the weighing of all the ingredients except, perhaps, those added in very minor amounts, and the ascertainment of the work done by the grinding units.

It is, of course, perfectly easy to feed a uniform mixture of substances into a bin. It is not at all easy to withdraw a uniform mixture from that bin. The reason, known to every operating man, is that fine material tends to remain under the feed spout, while coarse pieces tend to roll toward the sides of the bin. If the fine and coarse materials are different substances, "bin separation" has occurred, and an opening in the bottom of the bin will not deliver a uniform mixture.

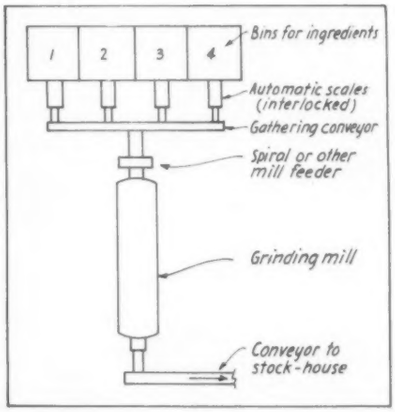


FIGURE 2.

When masonry cement is made in a Portland-cement mill the manufacturer has the choice of two procedures:

(1) He may occasionally put his entire clinker-grinding department to the grinding of masonry cement as often and for as long as is warranted by the sale of the latter. The same conveying system from the mills to the silos may

(Continued on page 45)

The new 28- by 60-foot dredge with A-frame and pontoons supporting the 55-foot cutting ladder.

McGrath Installs Second Dredge at Chillicothe Ballast Plant

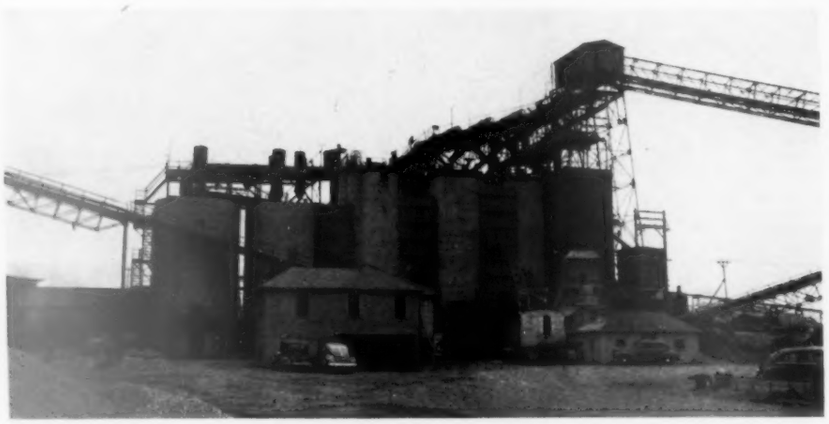
A NEW auxiliary dredge has just gone into service to supplement production at the Chillicothe, Illinois, plant of the McGrath Sand & Gravel Company. It will nearly double the raw-material production facilities with both dredges in service and will assure a steady stream of material for the huge processing plant in case either of the barges should be laid up for repairs.

The new dredge was completely designed and furnished by Meckum Engineering, Inc., of Chicago. The 28- by 60- by 5-foot hull is of steel-welded construction. It is built of six individual sections with twelve watertight compartments and was manufactured complete in the shops of the Graver Tank & Manufacturing Company. The six sections were bolted together in the water eliminating the launching of the complete hull. The deck house is of steel frame construction covered with corrugated sheeting. Two cylindrical steel pontoons with heavy steel A-frame support the 55-foot Meckum traveling chain cutter. The 15-inch Meckum pump is driven by an Allis-Chalmers 400-horsepower, 3-phase variable-speed motor utilizing current at 4,000 volts. All the controls are conveniently grouped forward on the operator's platform.

G.E. drum-type switches control the dredge pump and the Thomas 3-drum hoist, while individual Wadsworth switches start or stop the prime and wash-down pumps, hoist, cutter, etc. The 2½- by 2-inch prime pump was supplied by the American Well Works and is driven by an Allis-Chalmers motor. The 5- by 4-inch Allis Chalmers wash-down pump is powered by a G.E. motor. The piping aboard the dredge was manufactured to specifications by A. Lucas & Son, Peoria.

Material brought up by the dredges is supplied to the steel-and-concrete plant, which has been in service with but few changes since its erection in 1931. It has a capacity of 400 tons per hour, a large share of the output being ballast, sold principally to the Santa Fe Railway. The dredge lines discharge to a sump on shore from which two 30-inch Link-Belt dewatering bucket elevators load a conveyor which carries the material to a washing station. Here everything over 4 inches in size is scalped out by a revolving screen and the "throughs" are scrubbed by two McLanahan & Stone log-washers. The washed material and the

The 15-inch dredge pump is driven by a 400-horsepower motor which uses current at 4,000 volts.

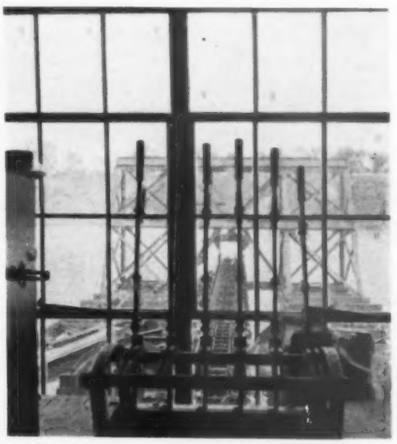


The Chillicothe processing plant has a capacity of 400 tons per hour.

The cutting ladder and suction line.

scalped-out oversize are recombined and carried by a 36-inch by 550-foot inclined belt-conveyor up to the screening plant.

The sizing is done by a battery of Link-Belt conical screens and two vibrators, additional washing being accomplished at the screens. The oversize is first scalped off and chuted to a steel bin which feeds a Symons 4-foot cone crusher, the crushed product being returned to the main conveyor by a belt. Sand is made in a series of Shaw classifiers. There are five 24-foot diameter reinforced-concrete stor-



This view shows the hoist levers on board the dredge. The cutting ladder may also be seen through the window.

age silos, two for sand and three for gravel. Considerable finished material is placed in open storage by a 510-foot overhead belt-conveyor equipped with a tripper, reclamation being made *via* a tunnel belt-conveyor. All the conveyor structures and supporting bents are of steel with concrete footings. A separate semi-portable plant is oper-

Some of the switches which control the various motors on the dredge.

ated intermittently to produce aggregates to meet Illinois Highways Department specifications.

The company's main offices are at Lincoln, Illinois, with district sales offices maintained at Peoria and Springfield. Other plants are located at Pekin, Bloomington and Forreston. All were originally designed, built and equipped for the most part by the Link-Belt Company.

Sonntag *(from page 43)*

be used, the masonry cement, of course, being stored in special bins.

(2) He may permanently set aside some of his clinker-grinding machinery for more-or-less continuous operation on masonry cement only. This will require a separate conveying system from the mills to storage, but the mixing system may be simpler than under the first plan.

Suppose that four major ingredients are used in a given mill in making masonry cement. A possible flow-sheet according to the first plan is shown in Figure 1. It involves a bin for each ingredient, this bin to be filled by an overhead crane or other suitable device, an automatic scale under each bin, a gathering-and-conveying system to deliver the mixture to the bins ahead of the grinding mills, and an automatic scale feeding each mill. Since these mills ordinarily grind Portland cement, an automatic gypsum scale is provided for each. This may be stopped when grinding masonry cement. The four proportioning scales are interlocked on the "all-or-none" principle, as are the clinker and gypsum scales feeding each mill.

With this arrangement a certain amount of bin separation in the feed tanks of the mills may be expected, but if the mixture is fed to one bin only for a certain number of minutes, then is shut off from that one and fed to the next for the same length of time, and so on in rotation, no bin being allowed to become completely full or entirely empty, the mixed product of several grinding mills will be practically uniform.

A possible arrangement under the second plan is shown in Figure 2. Here the four proportioning scales discharge into a gathering conveyor which feeds the grinding mill direct. There is no opportunity for bin separation, for after the mixture has been ground it is too fine to separate. This plan allows the simultaneous manufacture of Portland and masonry cements, but, as before stated, a separate conveyor system to storage is needed.

A third possibility is to grind masonry and Portland cements in separate mills, but to discharge into the same conveying system, and to operate either the Portland or the masonry mill or mills, but never both at the same time. There seems to be but little merit to this idea, for much time would be lost by the Portland mills while waiting for a relatively small amount of masonry cement to be ground.

The flow-sheets shown are purely suggestions, for the number and size of the bins and scales would depend on the number of the ingredients and the relative proportions in which they are used, while the positions of the bins would depend on the means used for filling them and, perhaps, on other local conditions.

Either of these arrangements will allow the accurate proportioning of the ingredients of a product that has just about passed from the realm of empiricism and experimentation to a definite place among the construction materials of to-day.

While the foregoing discussion pertains more particularly to masonry cement, modifications of the arrangements suggested will be eminently suitable for the manufacture of special Portland cements, such as are called for under some of the recent specifications. For some of these clinker of special composition is used, and silica, iron oxide and perhaps other things are added to the raw material when the quarry or other source does not carry them in sufficient quantity or in the desired ratio. Automatic scales eliminate the human element, and insure that additions are made in the proper amounts and in the desired proportions.

Stone Industry Bears Heavy Tax Load

Federal income taxes place much heavier burdens on some industries than others, it was found by the industrial economics division of the National Industrial Conference Board in a study which included the stone, clay and glass-products industry.

Although suffering less from the situation than other industries subject to greater fluctuations in annual earnings, manufacturers of stone, clay and glass products were shown by the study to be carrying a heavier tax load than a number of others.

The main cause of this discrimination, the board declares, lies in the circumstance that corporations are required to compute their tax liabilities on their net taxable incomes each year, with little or no allowance for losses incurred in prior years.

If fluctuations in profits and losses were the same in all industries, profits could be taxed in good years, and losses

(Continued on page 47)

Original Operating Kinks Revealed in Small New Jersey Sand-Gravel Plant

A general view of the Dallenbach shore operations.

WHENEVER anyone in these dark days loses his faith in the ingenuity and resourcefulness of the American people a sure cure would be to visit some of the smaller sand-and-gravel plants which dot the landscape. This writer, for one, is convinced that nowhere is so much accomplished for so little expense, and this does not mean that hay- or bailing-wire is used in making repairs. The answer seems to be that the operators of small plants must make every dollar count and that necessity is the mother of invention.

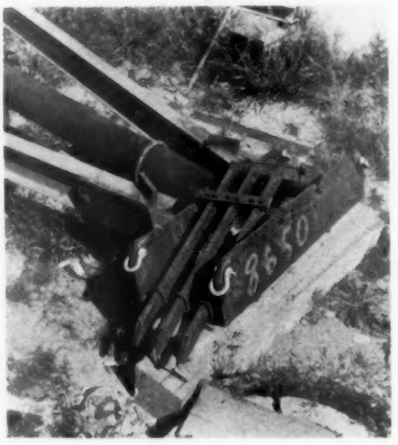
An operation that abounds in original ideas is that of the Dallenbach Sand & Gravel Company near Milltown, New Jersey. This company entered this field 15 years ago on a small-scale near its present location and has prospered and grown steadily. Successive plants have been built as operations were moved to new locations when deposits were worked out. A common characteristic of all these plants was their simplicity. In 1938 the plant now being used was erected. This has a capacity of about 100 tons per hour with sand forming from 70 to 80 per cent. of the output. At the present rate of production it will be necessary to move to a new location in about 3 years.

The deposit has an average of 40 feet of good material but is not worked to its full depth. From 10 to 12 feet of the deposit is above water level. The jungle growth covering most of the deposit is removed in the winter, at which time a ¾-cubic yard Byers gasoline drag-line is used to take off the 3-foot (average) overburden. A Caterpillar 15 tractor equipped with a bulldozer is also used for this and other work about the plant.

The dredge is 14 years old but was rebuilt in March, 1940. At that time a new 8-inch Amsco pump was installed and other improvements were made. This is a standard pump with a 100-horsepower Westinghouse motor but has oversize shafts, bearings, etc., so a 150-horsepower motor can be used when operations are extended beyond the 400- to 500-foot economical operating range of the present installation. At that time a shell and impeller for a water-seal type of pump will be installed and only the old pedestal and shaft will be used. The dredge now has a 25-foot suction nozzle which is operated by the same hoist which operates the shore-lines.

The dredge-pipe-line discharges at about 28 feet above water level into a breaker box from which the water and material flow into an 80-inch by 8-foot Stephens-Adamson Gilbert conical screen. This has 2½-inch and 3/16-inch perforations on its inner and outer jackets, respectively. The small amount of oversize goes to a waste-pile.

The gravel drops on a pile from which it is transferred to a stock-pile by the ⅜-cubic yard Byers 128 gasoline crawler crane which is used in off seasons for stripping. This crane also



Cutting device designed by the company which will be installed on the dredge. It also serves as a screen to reject large bowlders.

feeds this gravel to a hopper over a 3- by 8-foot Link-Belt 3-deck screen which is usually fitted with 2½-, 1½-, and ⅜-inch wire cloth. The small amount of oversize from this screen is wasted and the 2½- and 1½- inch and pea gravels are discharged to separate piles. The same Byers crane loads trucks from these piles for delivery.

The sand from the Gilbert screen is flumed to a pair of steel settling boxes of the company's own design. These are plain boxes 9 feet wide, 25 feet long and 10 feet deep. The feed is split to them except when the extreme fines are excessive. Then only one box is used. The State of New Jersey specifies from 12 to 25 per cent. through 50-mesh and this is easily met.

The sand is removed from these boxes by a Dobbie stiff-leg derrick with a 50-foot mast, a 100-foot boom, and

The hydraulic dredge with jet breaking down the bank.

a 1½-cubic yard digging-type Owens clam-shell bucket. An Orr & Sembower 3-drum hoist operates the bucket and boom and a 1-drum Lidgerwood hoist controls the swing. The sand is discharged on a stock-pile or into batching bins. One bin has a capacity of 80 tons. The other is a 120-ton Butler 3-compartment bin which is also used only for sand.

In another part of the yard gravel is stock-piled by trucks near a 150-ton 3-compartment steel batcher bin of the

Crane used to re-handle gravel.

company's own design. This bin has sides much steeper than customary in order to prevent sticking of the material under any conditions. Under this bin is a Butler 1-cubic yard weighing batcher with a Kron dial scale. This equipment was taken from the Butler bin now used for sand and can be replaced at any time. Under the batcher are two chutes, one for loading concrete truck-mixers and the other for

Walter Dallenbach and the batcher bin with high-sloping sides which he designed to keep material from sticking.

loading batch or dump trucks. These chutes are mounted on rails and can be moved readily in or out of position.

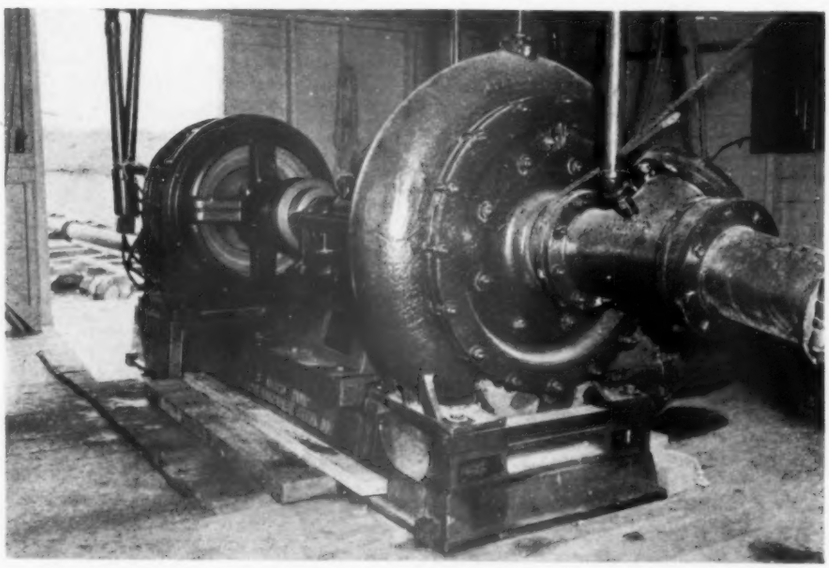
All shipments are made in trucks and are weighed on a Myers truck scale at the plant office.

The stock-piling space near the plant is now somewhat cramped so a new primary-screening plant was built last winter closer to the dredge pond. This plant is an exact duplicate of the one already described and is equipped with a new Gilbert screen. As soon as the rush season is over this plant will be put in operation and the present one dismantled.

Although the gravel averages about 25 per cent. of the deposits, it varies in spots from 20 up to 40 or 50 per cent. This means that within a few minutes' time the feed to the plant may vary accordingly. A special cutter-head has been developed to make it possible, by swinging the dredge, to average up the intake and obtain a steadier flow of material to the plant. An attempt will be made to penetrate with this cutter a bed of hard pan which has prevented working of the deposit to its full depth.

The cutter-head consists of a cage formed by six teeth or cutters, three on each side of the nozzle and sloping down sideways over it. These bars are spaced 4 inches apart and also act as screens. A steel bottom plate under the nozzle has 3 openings, and plates at the front and back complete the inclosure of the cage. As the dredge is swung the teeth on the cage are expected to cut through the hard pan. The nozzle and cutter-head are attached to a steel frame and will be suspended from a special steel A-frame. The whole assembly has been so designed that, if the cutter-head proves unsatisfactory, these frames and the nozzle can be used with a revolving cutter-head.

Most of the many original features incorporated in this plant were developed by Walter Dallenbach, secretary-treasurer, and Jacob Dallenbach, manager of the company. Robert Herbert, Jr. is president.



The 8-inch dredge pump and 100-horsepower motor.

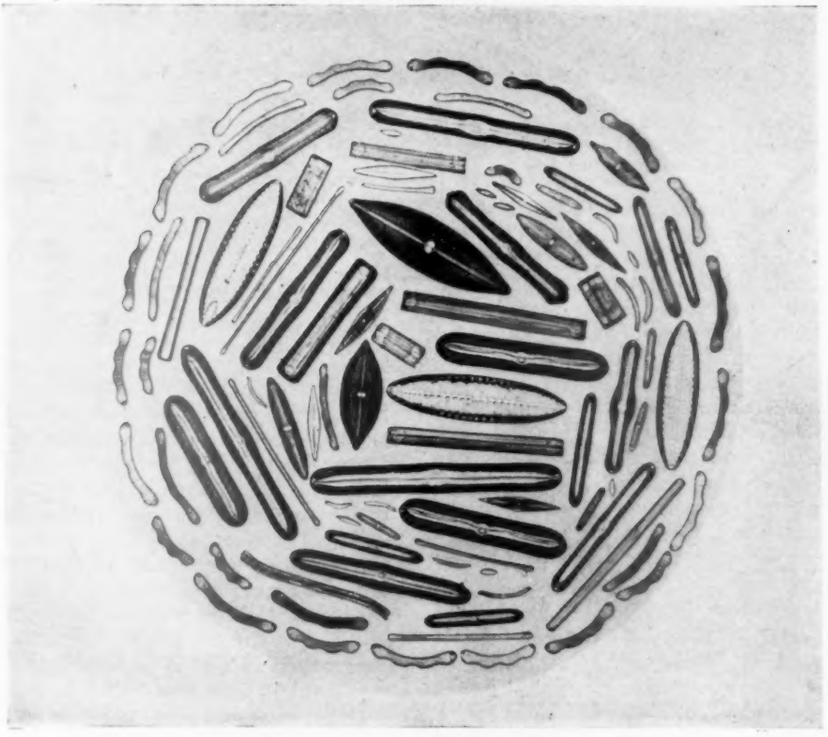
Taxes (from page 45)

in bad years could be ignored, without taxing the long-term profits of one industry more heavily than another, the board notes. Fluctuations in profits and losses are different in different industries, however, so that the present tax system aggravates the inequalities caused by business fluctuations.

This is evident from statistics on 15 major industrial groups during the period from 1922 to 1937, according to the board, which found that in that span of years the food and chemical industries paid 15.6 per cent. of their net income less deficit in federal income taxes. whereas the lumber industry paid 47.4 per cent.

Corresponding percentages for other manufacturing industries were cited as follows: Printing and publishing, 16.4; metal and metal products, 16.7; paper, pulp and products, 17.3; stone, clay and glass products, 17.4; leather and leather products, 25.9; rubber and rubber goods, 26.4; textile mill products, 28.7; lumber and wood products, 47.4; all others, 20.6. The figure for all corporations was 18.8, compared with a percentage of 17.6 for all manufacturing corporations. Percentages given for other industries included: Transportation and other public utilities, 17.2; trade, 21.9, and construction, 28 9. A group of industries classified by the Bureau of Internal Revenue as the service industry, it was found, paid $33,000,000 in federal taxes, although it incurred a deficit in excess of net income.

The diatomite plant and some of the bagged product in foreground.



Micrographic sketch of fossil remains of diatoms.

Florida Bog Supplies Material Yielding Commercial Diatomite

IN the nonmetallic-minerals industries there are a number of products which seldom get into print because of their relatively low annual output and the fact that only a few plants are operated. The production of diatomaceous earth or diatomite comes in this category. Although this country is one of the leading producers, the output in recent years has averaged less than 100,000 tons annually and most of this comes from several large producers operating deposits of marine origin. There are a number of smaller producers scattered throughout the country, most of whom also work marine deposits.

The formation of diatomite deposits is unusually interesting, consisting of the fossil remains of microscopic aquatic plants known as distams. Each of these tiny plants is inclosed in a siliceous shell and when it dies and sinks to the bottom the organic matter decomposes, leaving a deposit of shells.

One of the few commercial operations producing diatomite of freshwater origin is located in central Florida, and is owned by the American Diatomite Corporation. This firm has its preliminary processing plant at one of the deposits 18 miles south of Clermont and has its finishing plant at Clermont. The company owns six deposits containing an estimated 150,000 tons of finished product.

The deposit being worked at present is in a bog and varies from 4 to 20 feet in thickness. There is no overburden and there is peat and sand under the deposit. The water is removed by a 4-inch pump over a dam which keeps this part of the marsh dry. The diatomite is excavated by power and is loaded into trucks which carry it to the plant, where the diatomite is unloaded by hand into forms lined with burlap. The burlap is then wrapped about each cake or pillow and these are stacked in piles 8 feet high on a movable platform under the press.

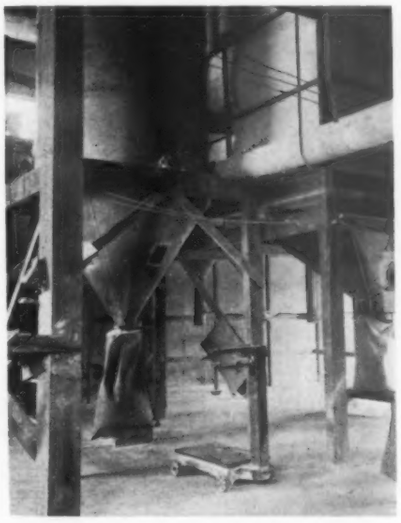
The hydraulic press is similar to those used for making apple cider and makes 72 cakes at once. The cakes are 1 foot square and 2 inches thick when removed from the press, and are then hauled to outdoor drying racks.

Workmen loading material from drained-off bog.

Usually after about 2 days the cakes are hauled in trucks to the plant at Clermont for further drying and processing. There they are placed in 3- by 4- by 4-foot steel baskets which are lifted by means of electric hoists and suspended in four batch furnaces. These furnaces are fired from below with

Pressed cakes of material on the drying racks.

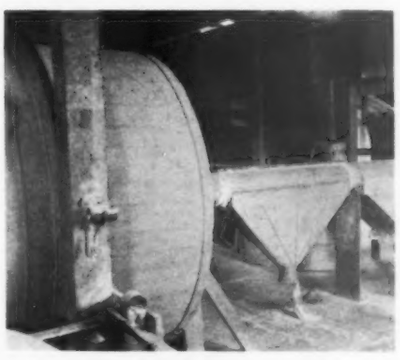
wood. Local oak is used as other wood smokes the product too much. In this process the organic matter burns out of the cakes at a temperature of 1,500 degrees F., leaving only the diatomite. After from 6 to 8 hours in the furnace a basket is removed and its contents are deposited in a bin, whence



Sacking spouts beneath cyclone and cloth collector.

it is withdrawn into a system of specially-treated rolls and is then conveyed to a 6- by 20-foot revolving-drum disintegrator lined with baffles. A wood-fired brick furnace at one end of the disintegrator maintains a temperature of about 150 degrees F. to keep out moisture.

A fan draws the separated diatoms out of the drum and through a pipe with a series of sand traps which remove foreign matter. The finer material is discharged tangentially into a



Revolving-drum disintegrator. Sand traps at right.

6-foot diameter by 12-foot cyclone-type separator. The product of this separator is monolite, a 98-per cent. pure silica with a fineness of 95 per cent. through 125-mesh. This product is used for filtering liquors, wines, milk, naphtha and other liquids. It is also being widely used as an admixture in concrete to increase its density and strength.

Material passing this separator goes into a wooden-walled room which settles out a 95 per cent. through 225-mesh product containing very little sand. This product is used in the manufacture of rubber, and plastics.

The material passing through this room goes into a second room with cloth walls. The product settled out in this room is Superlite, a 95 per cent. through 300-mesh product. This is used in paints, varnishes, automobile polishes and as a carrier for pharmaceuticals and insecticides.

The material passing through this room passes into a third room which is also cloth-walled. The material passing through this room goes to a 4-cell dust-collector and the material settled out in both is sold as "Var-Cell", an ultrafine product used for silver and other fine polishes, in lacquers, varnishes, cosmetics, etc.

Each of these materials weighs about 7½ pounds per cubic foot when packed and is loaded through spouts into 50-pound bags. Paper bags are used for the finer products and jute bags for the coarser ones.

The capacity of these operations is now about 4 tons daily of the finished product. This forms about 6 per cent. recovery of the material excavated. The remainder is water and vegetable matter. It is planned to increase the plant's capacity to about 10 tons daily. Shipments are made to all parts of this country and to foreign countries.

Illinois *(from page 31)*

was determined and the resources of such materials in Illinois shown to be extensive.

Building Stone.—Although interior decorative stone and stone for exterior construction are produced in Illinois, the variety of materials so used is limited and is by no means commensurate with the diversity of the building stones available in the state. In part responsible for this situation has been the lack of knowledge regarding the considerable variety of stones available and their appearance when cut and polished or otherwise prepared for use. The survey has recently investigated building-stone resources and placed on display in its new building a collection of representative Illinois materials. Included are brown and buff commercial travertines; a variety of commercial marbles chiefly of the "service" type; buff, brown, gray, and white limestones and dolomites for exterior use; and sandstones of diverse colors and textures.

Mineralogical-Composition Studies.—A detailed study of the commercial limestones and dolomites of Illinois is also in progress which has as its objective a better and more intimate knowledge of the chemical and mineralogical composition of the various strata composing the deposits of the state's stone industry. This investigation involves foot-by-foot sampling, determination of the amount of material insoluble in acid, examination and description of the insoluble material, and a study of the texture of the samples. On the basis of these data composite samples are made up from the field samples and the former carefully analyzed. This work, though not yet completed, has already proved its practical value in several instances by enabling quarry operators to produce better or different products.

The way in which rocks crush and pulverize is of much importance to the producers of stone products such as whiting, fillers, and the like. Particle-size distribution, grain shape, and specific surface are significant properties of such materials. Little information is available regarding these properties of the powders produced by crushing different Illinois limestones and dolomites, especially in relation to the many textural varieties of such rocks. A project now under way is designed to supply the needed information.

The Illinois Waterway from Lake Michigan to the Gulf affords cheap transportation for stone and stone products to markets both in and outside the state. Therefore, the mineral resources along this waterway are of much potential importance. With this in mind a study has been made of the non-metallic mineral resources along the waterway and it indicates the availability of a great variety of stone and stone-product-making materials suitable for many different purposes.

The economics of the stone and stone products industry is given continuing attention by the Mineral Economics Division of the survey. Annual production reports are published for the industry as a whole with special reports on agricultural-limestone production and on other matters of particular interest to the industry. Thus, Illinois industry is kept informed of the significant economic developments of the time.

Find Asbestos Deposit Near Cedral, Mexico

An asbestos deposit is reported to have been discovered near Cedral, San Luis Potosi, Mexico, about 10 or 12 kilometers from a railroad, the Bureau of Mines reports. The extent of the deposit has not been determined, although it has outcroppings. The deposit has never been exploited, and before it is worked it would be necessary to build a road between the operation and the railroad.

The Lubrication of Equipment

Part VII. Ball- and Roller-Bearings

By JAMES I. CLOWER
Associate Professor of Machine Design
Virginia Polytechnic Institute

AS in all other branches of industry, the application of ball- and roller-bearings to pit-and-quarry equipment is quite common and continues to increase. To-day they are applied to many of the friction points of vibrating screens, belt-conveyors, shovels, cranes, drag-lines, jaw crushers and many other machines. In fact, there is scarcely a wheel, shaft, or spindle for which the application of a ball- or roller-bearing may not sensibly be considered. Their principal advantages as compared with plain-journal bearings are: reduced friction, increased life, smaller space requirements, and less lubrication attention.

The major factor militating against their use is an economic and not an engineering matter. Generally, the first cost of these bearings is greater than that of plain-journal bearings. Maintenance costs, however, are generally lower.

Proper lubrication of ball- and roller-bearings, like that of plain-journal bearings, is essential for efficient operation and long life. It ranks with proper mounting and the selection of the right type and capacity bearing for its particular duty. Because the operation of ball- and roller-bearings is so simple and easy, inadequate attention is often given to their lubrication.

Functions of Lubricants.—The essential functions of a lubricant for ball- and roller-bearings are:

1. To protect highly-polished surfaces from rust and wear.
2. To minimize the friction between stationary and moving parts.
3. To aid in the dissipation of heat generated by the deformation of the load-bearing parts and friction between the retainer and the balls or rollers.
4. To form a supplementary seal between the stationary and rotating parts, which prevents the ingress of dirt, dust, water, etc. and minimizes the leakage of lubricant from the bearing.

Ball- and roller-bearings are accurately made; the tolerances are often held to limits of 0.0001 inch, surfaces are ground and frequently lapped to an ultrafine finish. Such surfaces are naturally susceptible to rusting unless protected at all times by a correct lubricant. In addition to the rolling friction between the balls or rollers and their races, sliding action also occurs between the balls or rollers and the retainer. The points of such sliding in several types of bearings are shown in Figure 1.

Characteristics of Lubricants.—The required characteristics of lubricants for ball- and roller-bearings are: (a) high chemical stability; (b) minimum tendency to absorb moisture; and (c) maximum oiliness.

In all types of ball- and roller-bearings the load-bearing areas are very small; consequently, very high unit bearing pressures prevail. Unless the lubricant possesses sufficient viscosity to form a film capable of withstanding very high pressures metal-to-metal contact occurs, resulting in excessive wear and noisy operation. If the film does not rupture it aids in distributing the load over a larger area, thereby reducing the intenseness of pressure between the contact surfaces. It also cushions the balls and rollers as the load is alternately applied and removed during each revolution.

Under excessive load conditions that rupture the film oiliness is of prime importance, for under such conditions the film is an absorbed one and viscosity is virtuality of no significance. A lubricant may possess a high viscosity but at the same time be low in oiliness; or, conversely, it may have high oiliness and low viscosity.

Lubricants used for ball- and roller-bearings should obviously be free from abrasive materials. Rarely do lubricants contain such materials when they leave the refinery, but in too many instances they become contaminated through careless handling.

Drums and other containers are left uncovered; gun fittings are seldom, if ever, cleaned; oil retainers and seals are neglected, the ingress of dirt, dust and water being thus made possible. In repair work bearings are often washed

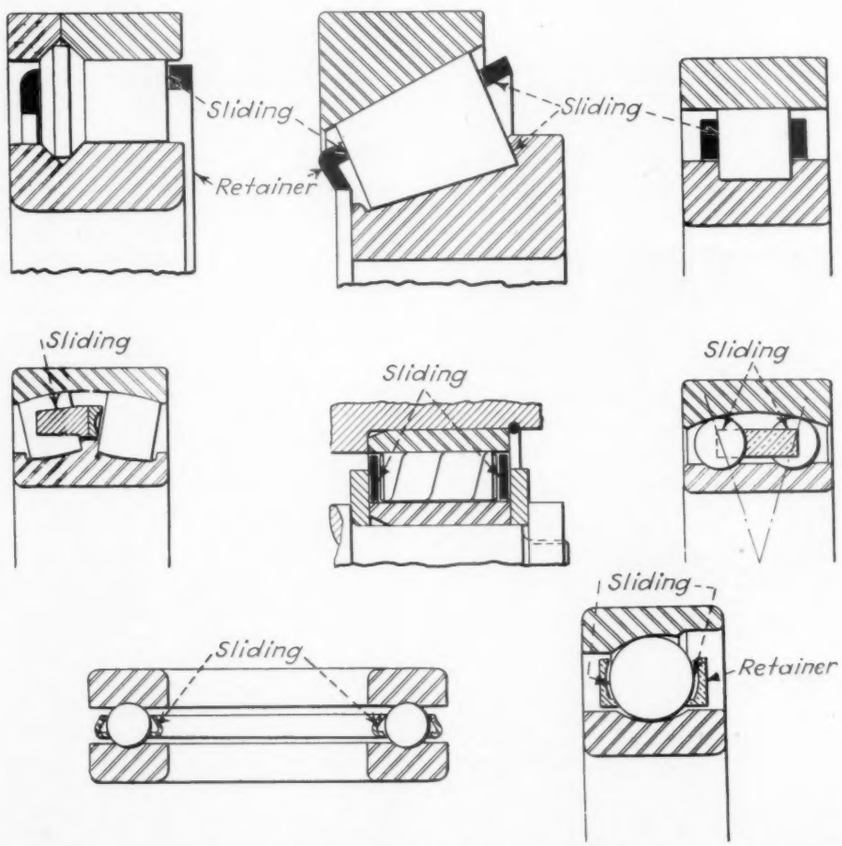


Figure 1. Points of sliding in ball- and roller-bearings.

with dirty gasoline. Solid matter tends to clog oil passages and ducts and the bearing itself, causing excessive wear and friction. Gummy deposits formed from oxidation products of the lubricants when subjected to high-temperature and high-speed conditions act in a similar manner.

Moisture is very detrimental to ball- and roller-bearings, and its presence in very small quantities will quickly cause severe corrosion. For this reason lubricants used in ball- and roller-bearings should be highly resistant to the absorption of moisture.

Lubricating Factors.—When selecting lubricants for ball- and roller bearings six factors should be given consideration: (a) the design of the housing, (b) the operating temperature, (c) the speed, (d) the load, (e) the size, and (f) the method of applying the lubricant.

Housings for ball- and roller-bearings vary in construction, depending chiefly on whether oil or grease is to be used as the lubricant. Oil is a more efficient

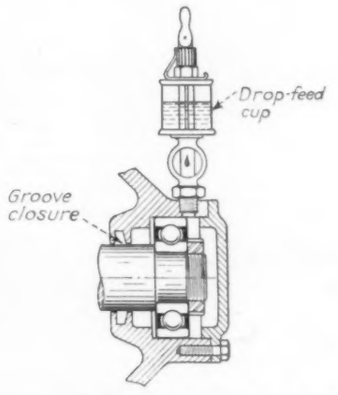


Figure 2. Sight drop-feed oiler applied to a ball-bearing.

lubricant for these bearings than grease because of its lower frictional resistance. It is, however, more difficult to prevent from leaking out of the housing, which leakage causes not only loss of oil but also an unsightly appearance and in some instances damage to parts such as commutators and electric insulation. Oil, therefore, requires a more complicated and expensive housing. Moreover, oil is not so effective as a seal to prevent the ingress of dirt and moisture and requires more frequent attention than grease.

In choosing a lubricant for ball- and roller-bearings the question of temperature is of major importance, because the viscosity of oil and the consistency of grease decrease rapidly as temperature rises. A lubricant that may be perfectly satisfactory at normal temperature would probably be unsuitable at a lower or higher temperature. Surrounding temperatures below 32 degrees F. require oils of low pour point (—10 degrees F. or lower) and of relatively low viscosity to insure ready distribution when starting. Operating temperatures above 150 degrees F. require comparatively high viscosity oils.

Similar considerations affect the selection of grease. Low temperatures (below 32 degrees F.) require soft- or medium-consistency grease for quick distribution, whereas at high temperatures (above 150 degrees F.) a high-grade soda-base grease of hard consistency (No. 3) that will not "bleed" or separate is required. If an unstable grease is used and bleeding occurs, the free oil may be thrown out, leaving in the bearing only the soap base, which hardens and thus renders little or no lubrication to the bearing. Furthermore, hardening and drying of some greases are accompanied by an increase in acidity that is likely to cause corrosion. This, however, can be overcome by using high-grade greases that do not deteriorate in use or storage.

Water, which is used in making grease soaps must be completely eliminated from the finished product, for its presence may cause hydrolysis, resulting in rapid decomposition and an increase in acidity.

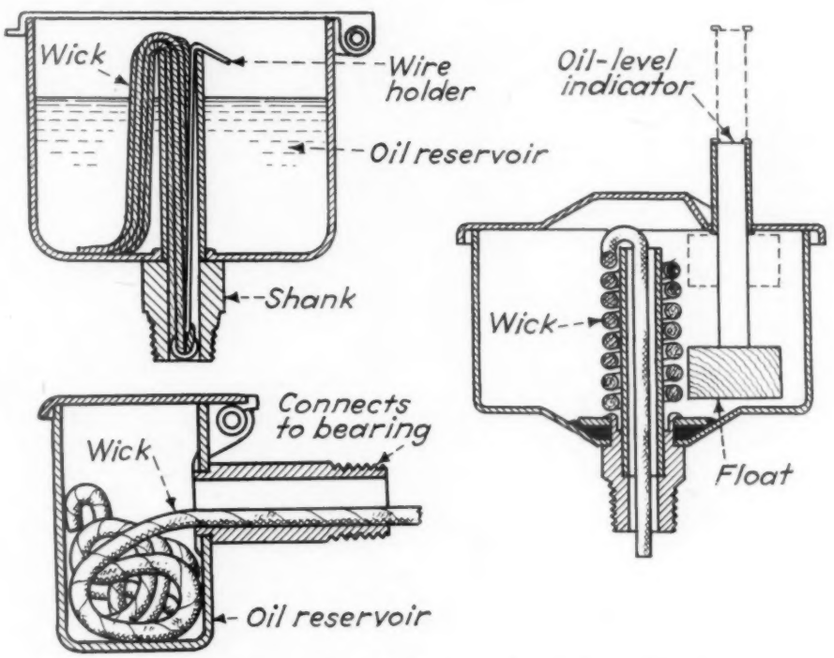


Figure 3. Various types of wick-feed oilers used on ball- and roller-bearings.

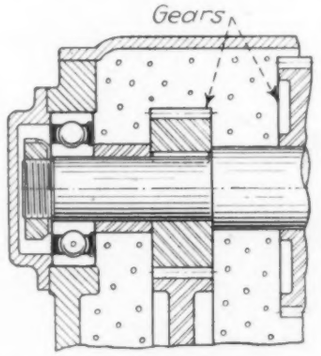


Figure 4. Ball-bearing splash-oiled by means of gears.

The operating temperature of ball- and roller-bearings depends on many factors, the most important ones being: (a) the load, (b) the speed, (c) the construction of the housing and support, (d) the surrounding air temperature, (e) the ventilating conditions, and (f) the quantity of lubricant used.

Naturally, the higher the load, speed, and surrounding air temperature, the higher will be the operating temperature. On the other hand, the more massive the housing and support and the better the ventilation, the lower will be the operating temperature.

Not the least of these factors is the quantity of lubricant packed in or fed to the bearing. In fact, once the housing has been designed and the bearing selected and mounted, this is the only controllable factor. A too meager supply or an oversupply will in either case cause overheating. Underlubrication means metal-to-metal contact resulting in rapid wear, heating, and early replacement. Overlubrication, especially in the case of grease, will also cause an early replacement of the bearing, but not because of wear. If an oversupply is provided, the bearing overheats because of excessive friction in the churning of the lubricant within the bearing. Such overheating causes expansion and

binding of the balls or rollers in the races. Such expansion tends to loosen the inner race from the shaft, allowing it to move about the shaft. Because the race is made of hard alloy steel and the shaft is generally of soft steel, the shaft wears rapidly, allowing misalinement and, eventually, pounding. Similarly, the outer race may become too loose in the housing and similar results follow.

Speed and temperature are related, temperature being in part the result of speed. High speed requires that if an oil is used it should be of low viscosity and used sparingly to prevent overheating. For the same reason, if a grease is used, it must be of soft consistency. Experience has proved, however, that an extremely hard grease may

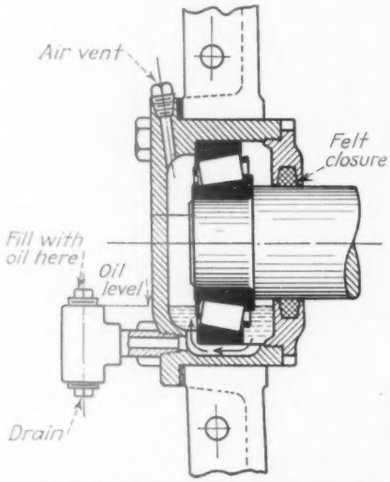


Figure 5. Bath-oiling applied to a tapered roller-bearing.

be used successfully at extremely high speed, say above 10,000 r.p.m. In this instance the grease channels, and a sufficient amount of oil for lubrication "sweats" from the grease. The grease used must be of such a consistency that

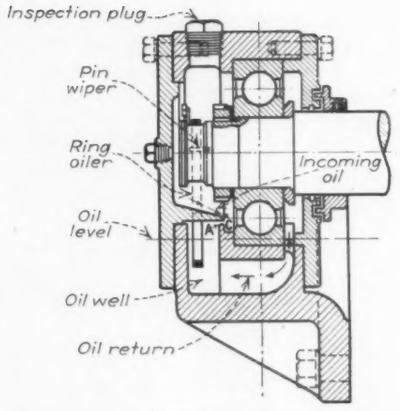


Figure 6. Ring oiler applied to a high-speed ball-bearing.

it remains quite hard at the operating temperature and the mineral oil of the grease should have a relatively low viscosity.

In general, oil is preferable for high speeds and grease for low speeds. Whether the dividing line is 1,000 or 2,000 r.p.m. depends on the method of application and the design of the housing and closure.

In connection with speed ball and retainer speeds are more reliable indexes of lubrication requirements than shaft speed, for bearings of two or more different sizes may be mounted on the same shaft; hence operate at the same r.p.m. but at quite different ball or roller speeds. For example, a small bearing mounted on a shaft, operating at, say 2,500 r.p.m., might be splash-lubricated, whereas a larger bearing mounted on the same shaft might, because of higher ball speed, create sufficient friction to cause overheating, necessitating the use of a different lubricant or method of application.

In any radially loaded ball- or roller-bearing the load on any particular ball or roller is not constant but varies from zero to some maximum value, depending on the position of the ball or roller with respect to the direction of the load on the bearing. The higher the speed, the shorter is the time during which any particular ball or roller is exposed to the maximum pressure, and the less likely is the oil film to be ruptured. However, owing to the spacing of the balls or rollers, the load is not transferred from one ball or roller to the adjacent one gradually but to a certain degree is applied suddenlv, resulting in

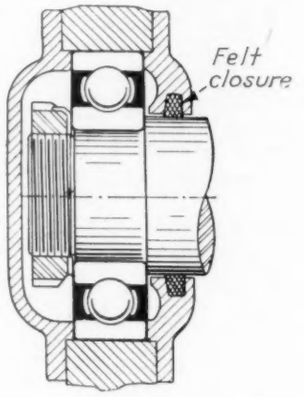


Figure 7. A simple grease-packed ball-bearing.

minute vibrations and impact or shock-load conditions. This action is greatly magnified at high speeds and is at least one reason for the decreased load-carrying capacity of these bearings at high speed. This more or less sudden transferring of the load from one ball or roller to the next also explains why these bearings are not suitable for certain precision-grinding spindles.

As previously indicated, size enters into the problem of selecting a lubricant for ball- and roller-bearings mainly because of its effect on ball or roller and separator speeds. If the speed of

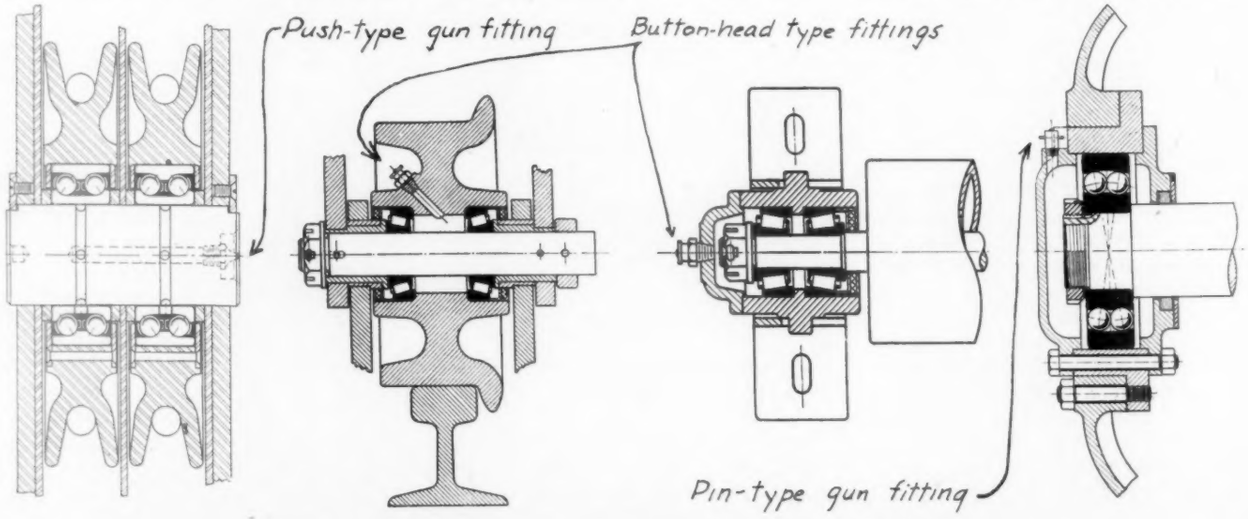


Figure 8. Various methods of applying greases to ball- and roller-bearings.

Table I—GUIDE TO SELECTION OF BALL- AND ROLLER-BEARING OILS

Type of Bearing	Operating Temperature (*degrees F.*)	Speed (*r.p.m.*)	Body of Oil	Viscosity (*S.U.S.*)		
				100°F.	130°F.	210°F.
Ball-bearings	32 to 140 (normal)	3,000 to 15,000	Extra light	65	48	36
	.....	300 to 3,000	Light	125	73	42
	.....	50 to 300	Heavy medium	285	128	48
	.....	Under 50	Heavy	380	160	51
	140 to 180 (high)	Over 3,000	Heavy medium	285	128	48
	.....	300 to 3,000	Heavy	380	160	51
	.....	Under 300	Extra heavy	500	200	56
	Over 180 (very high)	Any	Steam-cylinder oil	1,950	775	140
	Under 32	Any	Light	140	80	42
Roller-bearings	32 to 140 (normal)	300 to 3,000	Light	125	73	42
	.....	50 to 300	Heavy medium	285	128	47
	.....	Under 50	Heavy	380	160	51
	140 to 180 (high)	Over 3,000	Heavy medium	285	128	47
	.....	300 to 3,000	Heavy	380	160	51
	.....	Under 300	Extra heavy	505	200	55
	Over 180) (very high)	Any	Steam-cylinder oil	1,950	775	140
	Under 32	Any	Light	139	79	42

Table II—GUIDE TO SELECTION OF BALL- AND ROLLER-BEARING GREASES

Type of Bearing	Operating Temperature (*degrees F.*)	Speed (*r.p.m.*)	Type of Grease	Consistency	Viscosity of Mineral Oil (*S.U.S. at 100°F.*)
Ball and Roller-bearings	32 to 150	Up to 2,000	Lime or soda	No. 3* (medium)	400 to 500
	.....	3,000 to 5,000	Lime or soda	No. 2* (soft)	300 to 400
	.....	5,000 to 10,000	Soda	No. 1* (very soft)	200 to 300
	.....	Above 10,000	Soda	No. 0* (semifluid)	100 to 150
	150 to 200 (high)	Up to 2,000	Soda	No. 4† (Hard)	500 to 600
	.....	2,000 to 5,000	Soda	No. 3† (medium)	400 to 500
	.....	5,000 to 10,000	Soda	No. 2† (soft)	300 to 400
	.....	Above 10,000	Soda	No. 4† (hard)	200 to 300

*These greases should contain from 12 to 15 per cent. soap, the remainder should be pure mineral oil. Use lime-base greases in the presence of moisture, as soda-base grease emulsifies with water. These greases should be free from free acids, alkalies and fillers. The moisture and ash contents should be less than 2 per cent. Greases are not satisfactory for speeds above 5,000 r.p.m. where water is present.

†These greases should contain from 18 to 20 per cent. soap, the remainder should be pure mineral oil Greases should not be used in the presence of moisture at the temperature range of 150 to 200 degrees F. These greases should be devoid of free moisture, talc, rosin, graphite, mica, and any other filler. They should be of a smooth texture, not of a fibrous or spongy nature.

these elements is made the basis of selection rather than the shaft r.p.m., it is not necessary to consider size in choosing a suitable lubricant.

Methods of Applying Lubricants.—Methods of applying lubricant to ball- and roller-bearings may be considered under two general heads: (1) methods of oil application, and (2) methods of grease application.

Methods of applying oil may be considered further under the following heads:

1. Drop feed by means of (a) sight-feed cups (Figure 2) and, (b) wick-feed cups or boxes (Figure 3).
2. Splash, as in Figure 4.
3. Bath, as in Figure 5.
4. Ring, as in Figure 6.
5. Circulation, which employs a pump and in which the oil is freely and positively circulated through the bearing.

Methods of applying grease may be further sub-divided as follows:

1. Grease packed, as in Figure 7.
2. Grease gun, as in Figure 8. This is the method most generally used.
3. Grease cups, some designs of which are shown in Figure 9.

In the case of splash, circulation, and ring oiling the oil is used over and over for a considerable period of time, depending on the frequency of draining. For these systems a high-grade oil should be used so as to minimize oxidation and sludging.

Where drop feed is used, the oil is used only once and then runs to waste; thus the oil is not required to render long-continued service. Consequently, a relatively low-grade oil may be used, provided it is free of abrasive and other foreign matter and is noncorrosive.

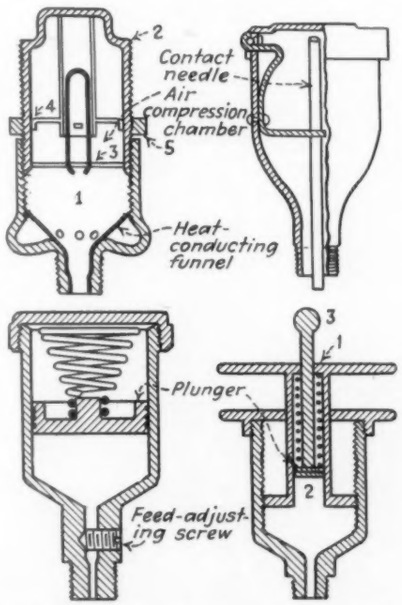


Figure 9. Various designs of grease cups suitable for use with ball- and roller-bearings.

The grease-packed method requires less attention than any of the other methods. Frequently, where operating conditions are not severe, which is rarely the case with pit-and-quarry equipment, ball- and roller-bearings are grease-packed in assembly and no further attention is required.

Where it is necessary to refill ball- and roller-bearings, this is usually done by means of grease cups or gun fittings screwed directly into the housing or connected through piping or tubing to a common header located at some convenient position. Where such fittings are used, it is advisable to tap a hole opposite the fitting and, when refilling, to add only enough grease to cause the old grease to ooze out of the tapped hole. Overfilling grease-packed bearings is a frequent mistake. *They should never be filled more than half full, and generally one-third full is sufficient and better.* Overfilling causes overheating and leakage, resulting in premature failure of the bearing.

Recommendations.—No rational method of selecting lubricants for ball- and roller-bearings has been developed. Consequently, recommendations specified by manufacturers of bearings and lubricants are based on experience and laboratory tests. Tables I and II are intended as guides only. They are based on wide experience and have proved reliable and satisfactory for the conditions indicated. For other conditions, such as heavy shock loads or extreme temperatures, either the bearing manufacturer or a reputable lubricant manufacturer should be consulted and his recommendations adhered to.

Terrazzo Made with White Cement Popular

"Many new uses for terrazzo have been developed in the last 15 years," says Paul F. Keatinge, manager, white-cement department, Trinity Portland Cement Company, in an article appearing in the current issue of *Flooring*.

"White terrazzo has been a popular type of floor for many years, and the increased use of white cement with terrazzo floors has resulted in more brilliant effects," Mr. Keatinge points out.

"Terrazzo men, practically without exception, are artists in the true sense of the word.

"Among the new developments that are rapidly winning new friends for terrazzo are colored-plastic divider strips, the finding of new marble aggregates with an almost unlimted range of color, and the improvement of white Portland cement."

PERSONAL MENTION

JOHN A. PHILBRICK of New York City has been made president of the Giant Portland Cement Company, succeeding CHARLES F. CONN who becomes chairman of the board of directors.

D. J. SHELTON, vice-president, has been elected president and general manager of the Marion Steam Shovel Company. The appointment was to succeed J. H. Watters, who has resigned to accept the presidency of the Union Asbestos & Rubber Company of Chicago. Mr. Watters will continue to serve as a member of the board of directors of the Marion company. ALEX GIBSON, treasurer, was elected vice-president to fill the vacancy created by the advancement of Mr. Shelton. He will continue to serve the company as treasurer.

W. J. THOMAS, who has spent nine years with the process-equipment division of The Babcock & Wilcox Company at Barberton, Ohio, has now been transferred to the executive department of the sales offices of The Babcock & Wilcox Tube Company at Beaver Falls, Pennsylvania.

HERMAN H. NAGEL, plant manager for the Standard Materials Company of Huntington, Indiana, has resigned to take a similar position with Cumberland Quarries, Inc., at Albany, Kentucky.

HARLOWE HARDINGE, president, of Hardinge Company, Inc., York, Pennsylvania, has recently returned from a six weeks' trip during which time he visited the mining district of Manitoba and British Columbia, Spokane, Los Angeles, Las Vegas, Salt Lake City and Butte. While in San Francisco, he attended the American Mining Congress Meeting.

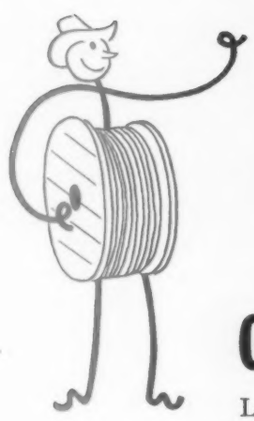
EDWARD WHITEHEAD, 76, chairman of the board of directors of Whitehead Brothers Company, New York, leading producer of industrial sands, died October 18 at his home in New Brunswick, New Jersey, after a long illness.

HERSCHELL CARTER, 48, president of Carter & Myers, Inc., Anderson, Indiana gravel firm, passed away recently at his Anderson home. The widow and two sons survive.

ALEX J. DION, 56, for the last five years in charge of the New York office of the Allentown Portland Cement Company, passed away a few weeks ago. He had been with the Allentown company for 35 years.

EUGENE R. ATWOOD, 74, treasurer and general manager of the Old Colony Crushed Stone Company of Quincy, Massachusetts, died October 17 at his home in Quincy. Early in life he was engaged in the manufacture of brick and tile and in 1902 became associated with the Old Colony Trap Rock Company of Quincy and remained with that organization for several years. In 1905, he formed the Tidewater Broken Stone Company at Quincy. He returned to the site of the Old Colony Trap Rock Company in 1908 and organized the Old Colony Crushed Stone Company.

MARTIN T. GEAKE, 60, superintendent of the Charles H. Geake Stone Company at Fort Wayne, Indiana, since 1917 died in a Van Wert, Ohio, hospital following an accident in which the automobile in which he was riding was struck by a train.



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GEOFF SAEGER, general supervising chemist of the Ideal Cement Company, Denver, died November 4 of a heart attack while visiting the company's Devil's Slide, Utah, plant. He became a member of the Ideal organization earlier this year following its acquisition of the Gulf Portland Cement Company. The deceased had been with the Gulf company since its plant was built a few years ago.

EDWIN STAN LUDWIG, 79, connected with the phosphate industry in Florida for nearly a half century, died at his home in Gainesville a short time ago.

JESSE W. VAN HOOK, part-owner of the Independent Sand & Gravel Company, Newton, Ohio, is dead at the age of 50 years.

LABOR DECISIONS

Wholesaler

Gerdert et al. v. Certified Poultry & Egg Company, Inc., et al., decided by the U. S. District Court, Southern District of Florida, Miami Division, April 29, 1941; reported at 38 Fed. Supp. 964.

It is ruled in this decision that a wholesale merchant who acquires most of his merchandise in other states, the goods being delivered to him by interstate transportation agencies, and later sells all of such merchandise locally, is not engaged in interstate commerce and not subject to the Fair Labor Standards Act. A private carrier (separately organized) delivering such goods in interstate commerce is held not subject to the maximum hours provisions nor to the overtime wage provisions, but otherwise to the minimum hourly wage provisions of the Act.

Noncompliance

National Labor Relations Board v. Giannasca, decided by the U. S. Circuit Court of Appeals, Second Circuit, May 5, 1941; reported at 119 Fed. (2d) 756; and

Waterman S. S. Corporation v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Fifth Circuit, May 16, 1941, amended on rehearing June 7, 1941; reported at 119 Fed. (2d) 760.

Each of these cases involved failure of an employer to comply with an order of the National Labor Relations Board. In the first, the court finds that an order to reinstate employees "immediately" must be interpreted liberally, and that in a shop which had less than 55 men the reëmployment of 30 men within seven working days was reasonable obedience to the order. However, the employer was fined for contempt for discriminating against the strikers in wages and for depriving the strikers of full relief by retaining strike-breakers.

In the *Waterman S. S. Corporation* case the Board also petitioned for a contempt order, but what was sought was a clarification of issues rather than punishment. The court ruled: (1) that since contracts of settlement between the employer and the employee are not binding on the Board, the Board ought on request to cooperate with the employer in framing a proper tender, and the court "should be slow to punish as contemptuous unassisted tenders which are not in all respects correct but made in good faith." (2) That where a discharged man worked elsewhere, compliance with the order of reinstatement and back pay required the employer to compute deductions from the back pay on the basis of the pay earned elsewhere rather than on the basis of the time worked elsewhere. (3) That the sale of a vessel on which some of the employees had worked did not end the employer's potential liability toward

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those employees after that sale. "The employer risks a back-pay order as a part of the consequences. He can not escape it by selling the ship, or by any voluntary abolition of the particular job."

Shipping Articles

Southern S. S. Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Third Circuit, May 6, 1941; reported at 120 Fed. (2d) 505.

A strike of seamen seeking recognition of a union occurred while a vessel was at dock at Houston, Texas. At the end of the voyage in Philadelphia five of the strikers were discharged, and seven other union members left the ship in protest. The National Labor Relations Board later ordered the employer to bargain with the union and to offer reinstatement and back pay to the employees concerned. One of the principal contentions of the steamship company was that the seamen's breach of the covenant "to be obedient to the lawful commands of the master," contained in the shipping articles, made the strike unlawful and justified the discharges. The court holds, however, that the breach of the agreement in the shipping articles, under the facts involved, did not deprive the striking seamen of the protection of the National Labor Relations Act. "The shipping articles did not bar the seamen's right to strike while their vessel was safely moored in an American port." (It is emphasized that the strikers were guilty of no unlawful conduct.) The Board's order is affirmed with certain modifications.

Investigation

National Labor Relations Board v. Barrett Company et al., decided by the U. S. Circuit Court of Appeals, Seventh Circuit, May 8, 1941; reported at 120 Fed. (2d) 583.

This was a proceeding to enforce subpoenas by which the National Labor Relations Board sought to inspect the employer's books and records, to determine whether the company's operations affected interstate commerce. The employer challenged the validity of the subpoenas on the ground that although a charge had been filed with the Board, no complaint against the employer had been issued by the Board. The court holds that the subpoenas are valid under the powers of investigation granted the board under the act. The court is "satisfied that the board's right (as well as its duty) to investigate, and in the course of its investigation, if need be, to issue subpoenas before it files a complaint, is clear."

Domination

Diamond T Motor Car Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, May 9, 1941; reported at 119 Fed. (2d) 978.

The National Labor Relations Board held that the employer concerned here had dominated or interfered with the formation or administration of a union of its employees, and issued an order requiring the company to withdraw recognition from that union and not to give effect to a contract with it. The finding was based largely on a statement to the employees by a vice-president, that there were three forms of organization: an A. F. of L., a C. I. O. or an independent organization, and that he would prefer to deal with the latter. The court holds that the statement cannot be held to be coercive in character, and even if it be deemed an expression of preference as between labor organizations, "a mere showing of preference does not constitute unlawful interference with an employee in the exercise of his rights under the act. It is only when such asserted preference, with all surrounding facts and circumstances, amounts to improper influence and approaches a coercive character that it is to be condemned." The order of the board is consequently denied enforcement.

Contract

Johnson v. Bee Line, Inc., decided by the Supreme Court of New York, May 9, 1941; reported at 28 N. Y. S. (2d) 18.

From 1934 till October 31, 1940, the union which is the plaintiff in this case, representing the employer's maintenance employees, had closed-shop agreements with the employer. During October, 1940, the New York Labor Relations Board, on petition of another union, conducted hearings to determine the proper representative of the employees for collective bargaining. On November 18, 1940, the plaintiff union and the employer made a new closed-shop agreement. On December 20, 1940, the board rendered a decision holding that the contract was no bar to the proceedings before it, and on February 17, 1941, the Board designated the other union as the representative of the employees, and ruled that all employees of the company (rather than the maintenance employees) constituted an appropriate unit.

In this suit the plaintiff union sought to require the employer to discharge employees who were not members of that union, under the terms of the contract of November 18, 1940. The Court, however, refused to grant that

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relief, holding (1) that the findings of the Board are binding on the Court, and (2) that the contract was not entered into in good faith, but solely to escape the effect of a possible adverse decision of the Board.

Employees' Plans

Bethlehem Steel Company et al. v. National Labor Relations Board, decided by the U. S. Court of Appeals for the District of Columbia, May 12, 1941; reported at 120 Fed. (2d) 641.

This decision sustains a decision of the National Labor Relations Board holding that the employer had dominated, interfered with, and contributed support to labor organizations, called "Plans of Employees' Representation," at certain of the company's plants, and had expressed to their employees their animus against an outside union; that the company had employed detectives to obtain, by surveillance, information about union activities; and, in other ways, had interfered with its employees' right of self-organization; and affirms the board's cease and desist order founded on those findings. Findings and order were also made against the Bethlehem Steel Corporation, which operates no physical properties. These also are affirmed by the court, on the ground that "the corporation, over a long period, actively supported the plans and actively opposed efforts of the men to join other labor organizations. It thereby made the company's domination, interference, restraint, etc., its own."

Watchman

Doyle v. Johnson Brothers, Inc., decided by the City Court of New York, Special Term, Kings County, May 17, 1941; reported at 176 Wisc. 656.

The defendant (employer) moved to have a complaint brought under the Fair Labor Standards Act dismissed on the ground that the duties of the plaintiff (employee) did not bring him within the purview of the act. The employer operates a lumber business, receiving practically all of its lumber from outside the state, and selling part of its products outside the state. The employee was a night watchman and yard worker. The court denied the motion to dismiss, citing cases establishing that the watchman is employed in an occupation necessary to the production of goods for interstate commerce and hence within the purview of the statute.

Delay

National Labor Relations Board v. Mall Tool Company decided by the U. S. Circuit Court of Appeals, Seventh Circuit, March 20, 1941, rehearing de-

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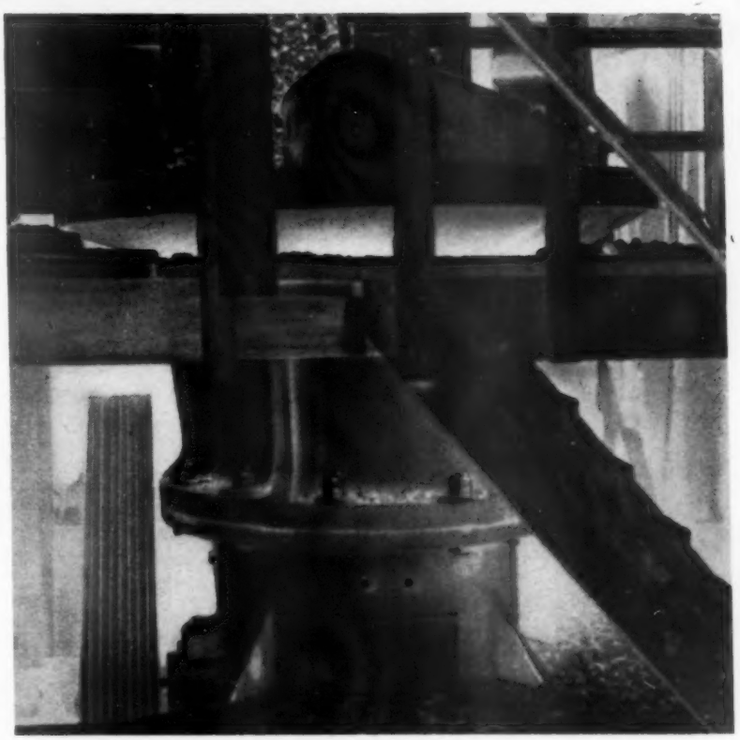

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—¾"—87.4% — —¼"—17.0%

Product cubical

Very small percentage of slabby particles.

If you need large tonnage of small product, the Traylor Multi-Stage Fine Reduction Crusher will make it for you at lowest possible unit cost.

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At one and the same time—

Simple
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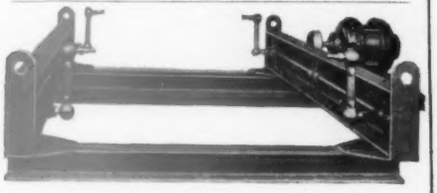


YES SIR—

FULLY CONTROLLED MOTION!

This patented equalizer assembly, connecting the body to base frame, CONTROLS the circular motion of the screening body of a SECO vibrating screen.

Without such control the maximum efficiency of the circular throw from a positive eccentric drive, is lost.

SECO Vibrating Screens
Are More Efficient

SCREEN EQUIPMENT CO., Inc.
9 Lafayette Ave. Buffalo, N. Y.

med May 22, 1941; reported at 119 Fed. (2d) 700.

An order of the board required the employer to cease and desist from unfair labor practices and to reinstate with back pay employees found to have been discriminated against. The record does not disclose that the employees were engaged in any negotiations with the employer between April, 1937, and the time of filing charges in September, 1938, and the court finds no mitigating circumstances justifying the delay. Consequently, while the order is in general affirmed, it is modified to require back pay only for the period subsequent to the filing of the charges.

Labor Dispute

Florsheim Shoe Store Company, Inc., et al. v. Retail Shoe Salesmen's Union of Brooklyn and Queens, Local 287, etc., decided by the New York Supreme Court, Appellate Division, Second Department, May 26, 1941; reported at 262 App. Div. 769 and 27 N. Y. S. (2d) 883.

The plaintiff employers made a closed-shop agreement with a bargaining agent certified by the New York State Labor Board, after an election held at the board's direction. A majority of the employees selected an A. F. of L. local union as their bargaining agent, and a minority group voted for the defendant C.I.O. union. After the making of the agreement the defendant minority union persisted in the continuance of a strike theretofore existing and in picketing the employees. The employers obtained a temporary injunction. which in this appeal is reversed. The Appellate Division holds that in spite of the election and certification of the majority union a "labor dispute" still exists, so that the complaint is insufficient in law for failure to set out allegations required by Section 876-a of the Civil Practice Act.

Strike

Eagle-Picher Mining & Smelting Company et al v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Eighth Circuit, May 21, 1941, rehearing denied June 9, 1941; reported at 119 Fed. (2d) 903.

The evidence is held to justify the board's findings that two unions of the petitioning company's employees were dominated and supported by the employer, and that the employer had encouraged membership in those unions and discouraged membership in an outside union. The employer contended that its employees who went on strike before the offending unions were formed, and did not return to work under a "back to work" movement, were not entitled to be dealt with as employees because the labor dispute which caused the strike was not current at the time of the board's hearing. The court holds, however, that under the precedent cases such striking employees are to be considered as employees for purposes of the National Labor Relations Act. The board's order, including portions requiring the reinstatement of certain employees, is affirmed with several formal modifications.

Interstate Commerce

Divine v. Levy et al., decided by the U. S. District Court, Western District of Louisiana, Shreveport Division, May 22, 1941; reported at 39 Fed. Supp. 44.

The plaintiff in this suit under the Fair Labor Standards Act of 1938 was a common laborer employed in the erection of drilling rigs and in the production of oil. The oil was sold by the employer to a company which, within the same state, converts it into refined products which are sold in interstate commerce. The court rules that the plaintiff was engaged in the production of goods for interstate commerce and entitled to the benefits of the Fair Labor Standards Act.

"The purpose of the act would be frustrated if the courts were to limit its beneficence to labor by technical interpretations. It would be technical in the instant case to say that the free flow of commerce would not be obstructed because there is a change in the ownership of the oil or because the finished product, the derivative of the crude oil, is the only thing that actually crosses the state line. . . . We believe that interstate commerce has begun in this case when the crude oil, through the efforts of plaintiff-laborer, first moved in the pores of the restraining sand stratum."

Order Modified

McQuay-Norris Manufacturing Company v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Seventh Circuit, May 22, 1941; reported at 119 Fed. (2d) 1009.

In an earlier decision (116 Fed. (2d) 748) the Court sustained an order of the National Labor Relations Board ordering the employer involved to cease and desist from refusing to bargain with the designated union and "in any other manner" interfering with, etc., its employees in their rights of self-organization. This decision modifies the earlier one by striking out the latter broad order, on the authority of the Supreme Court's decision in *National Labor Relations Board v. Express Publishing Co.,* 6 S. Ct. 693, decided March 3, 1941.

OCCUPATIONAL DISEASES and the LAW

Lung Injury

Messina v. United States Gypsum Company, decided by the New York Court of Appeals, July 29, 1941; reported at 286 N. Y. 82.

The plaintiff sued the defendant company to recover for personal injuries alleged to have been sustained by plaintiff through the negligence of the defendant in failing to provide the plaintiff with a properly ventilated place to work, by reason of which he contracted pneumoconiosis and fibrosis. The defendant was engaged in the manufacture of sanded and other plasters, and the complaint alleged that in the process thereof large quantities of silica dust were permitted to permeate the atmosphere, contrary to the provisions of Sections 27-29 and 299 of the New York Labor Law (Consolidated Laws, Chapter 31). The trial judge (in the New York Supreme Court) submitted to the jury the question whether the evidence justified a claim that plaintiff is suffering from a lung injury occasioned by the fault of the defendant and through no fault of his own. The verdict and judgment were in favor of the defendant. The judgment was subsequently unanimously affirmed by the Appellate Division of the Supreme Court, and is again affirmed in this appeal by the court of Appeals.

Exposure to Dust

C. K. Howard & Company et al. v. McKay et al., decided by the Supreme Court of Oklahoma, September 9, 1941, rehearing denied, October 7, 1941; reported at 117 Pac. (2d) 525.

This decision sustains an award of compensation by the Oklahoma State Industrial Commission "for a temporary total disability found to have resulted from an accidental personal injury, in the form of lead poisoning," which the worker had sustained while painting with a spray gun. The award was attacked on the ground that the disability, if any, was caused by an "occupational disease" over which the Industrial Commission had no jurisdiction. It is sustained, however, under the rule announced in *Tri-State Contractors v. Althouse,* 166 Okl. 296, 27 Pac. (2d) 1041: "An injury to an employee, engaged in a hazardous occupation, resulting from exposure to, and inhaling of, cement dust, during a short period of time (three weeks in this case), which begins to manifest itself soon after the employee is first exposed, and grows progressively worse, culminating at the end of such short and definite period of time in a disability, is sufficiently certain and definite in point of time to be an 'accidental injury' within the meaning of that term as used in connection with the Workmen's Compensation Act (Comp. St. 1921, § 7285, as amended by Laws 1923, c. 61, § 3, 85 Okl. St. Ann. § 11.)"

Trade Literature

CW-10 Carrimor Scraper . . . High Speed Earth Moving, 16 pages. LaPlant-Choate Manufacturing Company, Cedar Rapids, Iowa.

Type R Reduction Crusher With Speed-Set Product Control, 16 pages. Allis-Chalmers Manufacturing Company, Milwaukee.

Cedarapids Portable Horizontal Screening Plant. Iowa Manufacturing Company, Cedar Rapids, Iowa.

Pacific Jaw Crushers, 4 pages. (Bulletin 116). Alloy Steel & Metals Company, Los Angeles.

How to Determine Where Overhead Materials Handling Equipment Can be Used Profitably, 12 pages. Cleveland Crane & Engineering Company, Wickliffe, Ohio.

Why Farval Lubrication?, 8 pages. (Bulletin 167). Farval Corporation, Cleveland.

Blaw-Knox Buckets for Cement, Chemical and Fertilizer Plants, 12 pages. (Bulletin 1812). Blaw-Knox Company, Pittsburgh.

Superior Diesel Engines, 16 pages. (Bulletin 137). National Supply Company, Springfield, Ohio.

Elastic Stop Self-Locking Nuts, 4 pages. Elastic Stop Nut Corporation, Union, New Jersey.

Select the Correct Wire Rope, 4 pages. MacWhyte Company, Kenosha, Wisconsin.

Efficient Cement Kiln Firing with Whiting Impact Pulverizers, 4 pages. Whiting Corporation, Harvey, Illinois.

Baker Bulldozers and Gradebuilders, 28 pages. (Bulletin 834). Baker Manufacturing Company, Springfield, Illinois.

Facts About Towmotor . . . the "One-Man Gang", (Portfolio). Towmotor Company, Cleveland.

Hobart Simplified Arc-Welding, 36 pages. Hobart Brothers Company, Troy, Ohio.

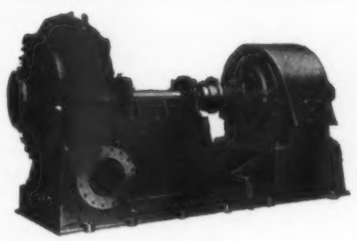
Texsteel and Texdrive Sheaves, 12 pages. (Bulletin B6047). Allis-Chalmers Manufacturing Company, Milwaukee.

Schramm Portable Air Compressors, 20 pages. (Bulletin 42-P). Schramm, Inc., West Chester, Pennsylvania.

The Flexible Steel Lacing Company of Chicago, have announced the appointment of John P. Ramsey as factory sales representative for New York and the New England States. This territory was formerly covered for the Flexible Steel Lacing Company by H. Irwin Reinhorn, who is now with the Ton-Tex Corporation of New York.

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



For longer service from your dredging and materials-handling pumps . . .

Material-handling pumps are naturally subject to severe wear. Impellers, wearing rings, shaft sleeves, shell liners are continuously abraded by the grinding and scouring action of the material being handled. The result . . . usually early and frequent replacement of parts or complete new units.

For three generations, Morris has been developing designs and materials to retard this wear. Today, when new equipment is so hard to get, this long experience is at your service to help you in the essential conservation of your present pumps.

If you are troubled with rapid wear of your centrifugal pumps . . . whether Morris or other design . . . consult the Morris engineers. They will advise you authoritatively and frankly how you can get longest service from your pumping equipment and how you can maintain highest possible efficiency.

MEMBER

For authoritative recommendations on any pumping or dredging problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal localities. *Export Office,* 50 Church St., New York.

TRAFFIC News Digest

I. C. C. Reports

Cement. Fourth section application No. 19027, cement to Atwood and Wolf Creek, Tennessee. By division two. Louisville & Nashville, and Atlanta, Birmingham and Coast authorized by F. S. O. 14407, on conditions, to establish and maintain rates no lower than 17 cents on cement from Birmingham, North Birmingham, Boyles and Phoenixville, Alabama, to Wolf Creek and Atwood, Tennessee, as to which temporary relief was given by F. S. O. 14204, without observing the long-and-short-haul part of the fourth section.

Lime. The Commission in a second report on further consideration in No. 19957, Northwestern Ohio Lime Manufacturers *et al. vs.* Pennsylvania *et al.*, on petition of defendants, rail carriers in official territory, has further modified its finding in prior reports 159 I. C. C. 9, and 183 I. C. C. 730. This finding modified that to the extent stated, rates on lime, carloads, from origins in Ohio to destinations in trunk-line and New England territories would be unreasonable for the future, as modified by a finding in a later report, 237 I. C. C. 300. Modification was asked in a petition of defendants filed June 11, 1941. The modification covers an adjustment of rates proposed in that petition. The Commission found these rates to be just and reasonable.

It was stated that an adjustment of the rates was found justified in prior report 237 I. C. C. 300, but that this adjustment was not established. The establishment of that adjustment was held in abeyance because shippers at northwestern Ohio producing points were dissatisfied as to some phases of the adjustment. The new adjustment was worked out after continued conferences between the shippers and carriers, and it was stated that no change in the prescribed basic level was proposed.

Among other changes were those which affected rates to points in trunk-line and New England border territory that were subject to one or another of the Boston, Pittsfield or Springfield, Massachusetts, bases. It was proposed that rates to such border points be made 110 per cent. of the scale prescribed in Eastern Lime Manufacturers Traffic Bureau *vs.* Akron & B. B. R.R. Co., 112 I. C. C. 7, instead of a basis of 120 per cent of that scale as originally proposed.

The Commission stated that the order entered in the last report, 237 I. C. C. 300, would be vacated and the order entered in the prior reports, 159 I. C. C. 9, and 183 I. C. C. 730, would be vacated effective with the establishment of the adjustment herein found justified.

Motor Reports

St. Bernice, Indiana. MC 102641, Sub. No. 1. Oliver J. Southard and James Pinson, common carrier application. Joint Board 21. Certificate proposed. Sand, gravel, and other bulk commodities usually transported in dump trunks, over irregular routes, between points in Vermillion county, Indiana, to points in Edgar county, Illinois.

Dewey, Oklahoma. MC 89963, Sub. 1. G. E. Chevalley. Extension, stone, brick and tile. Joint board 39. Certificate recommended. Brick and tile, Fredonia and Brickton, Kansas. Also pre-cast and natural stone,. in truckloads, from Wichita, Kansas, to Dewey, Oklahoma, and to points in Oklahoma within 160 miles of Dewey.

Yuma, Arizona. MC 14045, James M. Clint, dba Los Angeles-Yuma and Phoenix Freightlines. Common carrier application. Joint board 47. Certificate proposed. Continuance of operations, general commodities, with exceptions, between Los Angeles, California, and Yuma, Arizona, and also cement, lime and plaster, from Colton, California, to Yuma, Arizona.

Reinholds, Pennsylvania. MC 102664, Sub. 1. William Sebastian, common carrier application. Certificate recommended. Pulverized limestone, from points in Earl township, Lancaster county, Pennsylvania. to points in Delaware, Maryland and New Jersey.

Salem, Indiana. MC 76662, Sub. 1. Curtis Miller, contract carrier application. Joint board 155. Permit proposed. Hydrated lime, in bags, from Salem, Indiana, to Kosmosdale, Kentucky.

Central Freight Association

Docket 68590 (Shipper's proposal) Dolomite, refractory dolomite, in granular form, treated or untreated, clinkered and burned to a dead state. Carload. Established on, from Durbin, Ohio, to Erie, Pennsylvania. Via the N. Y. C., Cleveland, Ohio, N. Y. C. (W).

Docket 68600 (Shipper's Proposal) Stone, crushed, in bulk in open top cars. Stone screenings, in bulk in open top cars. Carload. Establish a rate of $1.18 per net ton from Bloomville, Ohio, to Ann Arbor, Michigan. Via the P. R. R., Toledo, Ohio, A. A. R. R.

TRI-VIBE

assures UNIFORMITY in *Fine Mesh Screening*

The Leahy HEAVY DUTY VIBRATING SCREEN

plus the extra productive capacity resulting from the triple-powered vibration of the free-swinging screen jacket. That is why the Tri-Vibe-equipped LEAHY Type C No-Blind Vibrating Screen enables you to obtain greater output from a smaller creen area. It's the Screen for YOU in nineteen forty-two!

Ask for Bulletin 14-H

The Deister Concentrator Company
The Original Deister Co.
Est. 1906
911 Glasgow Ave., Fort Wayne, Ind.

PERFORATED METAL SCREENS
FOR SAND, GRAVEL STONE, ETC.

Manufactured exactly to your specifications.

Any size or style screen, in thickness of steel wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices.

Prompt Shipment

CHICAGO PERFORATING CO.
2435 W. 24TH PLACE CHICAGO, ILL.
Telephone CANAL 1459

Docket 68630 (Carrier's proposal) Lime, common, hydrated, quick or slaked. Carload. In bags, barrels, casks, iron drums or in bulk. Establish a rate of 25 cents per 100, minimum weight 30,000 pounds, and 20 cents per 100, minimum weight 50,000, from Mosher and Ste. Genevieve, Missouri, to Trafford, Pennsylvania.

Fourth-Section Applications

Docket 19366—Filed by J. R. Peel requesting fourth section relief to establish rates on sand, gravel, and stone, in carloads, between points in Nebraska and points in the Southwest. To apply over short tariff routes. Rates constructed on the basis of the short line distance formula being grounds for relief.

Docket 19379—Filed by W. J. Bohan requesting fourth section relief to establish rates on cement, carloads, and returned cement sacks, carloads, from Oswego and Portland, Oregon, to points in Oregon and Washington. Circuitous routes being the grounds for relief. Schedule filed containing proposed rates is W. J. Bohan I. C. C. 665.

Docket 19387—Filed by W. S. Mercer requesting fourth section relief to establish rates on gravel road surfacing, carloads, from LaGrange, Missouri, to Augusta, Illinois. Wayside pit competition being the grounds for relief.

Docket 19390—Filed by B. T. Jones requesting fourth section relief to establish rates on lime common, carloads, and mortar, from Ohio and West Virginia, only, carloads, from producing points in central territory and Missouri, to destinations, in central territory on B. & O. and Erie and in trunk line and New England territories to meet carrier competition and to maintain grouping.

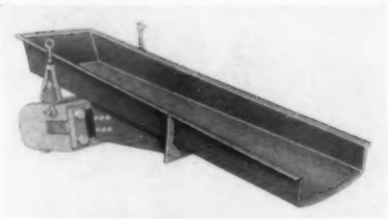
NEW MACHINERY and SUPPLIES

The Syntron Company, 385 Carson Street, Homer City, Pennsylvania, has just added two new models of electromagnetic vibratory feeder conveyors to its line.

The Model F-4 illustrated, has a capacity of up to 100 tons per hour of material such as crushed rock, and carries feeder pans as wide as 36 inches and as long as 60 inches in size.

The larger capacity Model F-5 will handle as much as 500 tons per hour of such material and can be supplied with troughs as wide as 48 inches and from 60 to 96 inches long.

These new models, like the smaller-capacity Syntron feeders, are vibrated at high speed by a pulsating electromagnet energized through the medium of a rectifier tube.



Electromagnetic vibratory feeder.

One major advantage is the finger-tip rheostat control of the rate of flow, permitting a range of feeds from a rushing torrent down to a slow dribble.

Full and complete information in a new catalog just off the press is obtainable from the manufacturer.

● Excavator

The newly developed Osgood Type 70 excavator is available with either conventional crawler mounting, or as an Osgood Mobil-Crane with pneumatic-tire wheel mountings.

Rated as a 1¼ cubic yard shovel or a 15-ton crane, it can perform the duties of a shovel, drag-line, clam-shell, crane, pile-driver, etc.

Unit cast steel construction of the deck gives a stronger base for the machinery and lessens vibration. The Type 70 is controlled throughout by air (except hoist drum brakes). The swing, travel, and retract motions (and when supplied, the independent travel mechanism, and independent boom hoist) are all controlled by use of Twin Disc clutches. This, with air control, gives a smoothness of operation of these motions that closely resembles steam operation.

Why cost-minded producers are installing *Simplicity* gyrating screens

There's nothing mysterious about the outstanding sales success of Simplicity gyrating screens in the aggregate industry. Producers are simply comparing first costs, depreciation costs, maintenance costs, and production speed of Simplicity units. And they soon see that Simplicity's give them by far the greatest value for their money.

Simplicity screens offer you a wealth of outstanding features including: Counterbalanced eccentric shaft; rubber-mounted screen corners, screens in four-way tension over doubly crowned surface, dust-sealed Alemite lubricated roller bearings; extra rugged construction.

You, too, will find that Simplicity gyrating screens will help you whittle down your processing costs, help you maintain greater production schedules. Write today for complete facts.

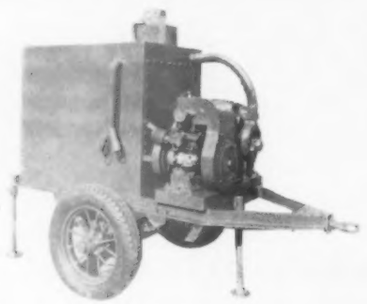
Right: A 5'x 12' Model D double deck Simplicity gyrating screen.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

DRILL *without* DUST

KADCO EQUIPMENT
Reduces Costs
Eliminates Hazard



Use KADCO Dust Control equipment on your rock drills for greater drilling footage—less blacksmithing—longer tool life—better working conditions. Available in a wide range of sizes for all operations. For sale or lease.

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FARREL BACON
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service.

EARLE C. BACON, Inc.
17 John St. New York, N. Y.

The Type 70 shovel mounted on crawlers.

The Type 70 crawler may be steered in any direction, without stopping the forward motion of the machine. Air operation of the steering clutches sets the brake at the same time it disengages the clutch. This may be done with the cab in any position over the trucks, air for operation is carried through the vertical travel shaft.

A new streamlined cab gives ample protection and full vision, and is made roomier to give greater access to machinery. All controls are banked in front of, and around the operator with a greater opportunity for precision in his work, and with practically no fatigue.

• Transmission

A new low-cost V-belt variable-speed transmission known as the JFS-CUB is being introduced to industry by the Standard Transmission Equipment Company, Los Angeles.

The JFS-CUB, the newest addition to the line of V-belt speed controls manufactured by the Company, is especially designed for all "A" section V-belt applications and for speed ranges up to 3.3-1. Smooth-sided pulleys are used rather than the interlocking type. Among the advantages claimed are: the patented positive belt alignment feature which makes possible the mounting of the "Cub" in any and every position without impairing function or throwing belts out of alignment; machined and balanced cast-iron construction, forced lubrication of the special bronze bearings on which the pulleys rotate; free-end pulley spindle to allow easy installation of belts; both pulleys on one side of pivotal mechanism which permits motor pulley and driven pulley to be almost directly in line with each other; etc.

Variable-speed transmissions.

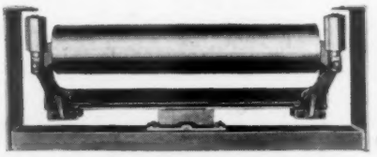
• Idler

Another new product—a swiveling, positive, self-aligning idler for automatically correcting misalignment of either carrying or return runs of non-reversing conveyor belts supported on flat-roll idlers, is announced by the Link-Belt Company, Indianapolis.

This new idler has a centrally-pivoted cross member which, besides being equipped with a flat idler roll for supporting the belt, has a vertically-mounted actuating roll at each end for lightly contacting the edge of the belt when its lateral misalignment exceeds a predetermined amount.

As but a slight pressure of belt edge against actuating roll serves to swivel the idler unit on its pivot sufficiently to guide the belt automatically, quickly, positively, back to proper alignment, any possibility of injury to belt edge is said to be avoided.

When used on return runs, one idler should be placed close to tail or takeup shaft so that the belt will be guided centrally on the pulley, and one at every ten or fifteen idler spaces. On the carrying run, one idler should be placed



Swiveling, pivoted idler.

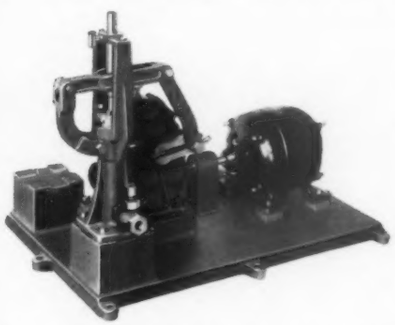
just beyond the loading chute, and one at every ten or fifteen spaces thereafter.

For flat-roll belt conveyors that must operate in either direction, self-aligning idlers of special design are available.

• Proportioning Pump

An L-type proportioning pump, finding increased use in handling oils, resins, glue and commercially prepared admixtures in manufacture of Portland and masonry cements, is offered by Hills-McCanna Company, Chicago.

The pump is designed accurately to meter fluids and solids in suspension, molten materials, boiler-water compounds, acids, alkalis, lime and oil slurry, and other light and heavy



Type L, motor-driven single-unit chemical proportioning pump.

substances. Available in single- and double-unit models, it is one of nine types offered by the company in more than 200 sizes for laboratory and processing applications.

The single-unit L-type pump is rated for a maximum capacity of 195 gallons per hour against pressures up to 65 pounds per square inch. Maximum capacity of 390 gallons with the same pressure range is afforded by the dual-unit pump, while with small capacities pressures as high as 1,200 pounds are handled. By reducing plunger travel, accurately metered volume control from full capacity down to 10 per cent. of maximum may be effected.

Cast iron and steel are normally used for the liquid ends or pump units, while in services involving corrosive solutions, all parts

The Owen Bucket Company of Cleveland, Ohio, announces an improved design of its four-line rehandling bucket. Suitable for any line spacing on all models of overhead cranes, this new bucket is available in various capacities and dimensions for rehandling of all materials.

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

1-Yard and 1¼ Yard

Keystone offers a standard *1¼ yard dipper and crane, Model 19-A,* for rock excavation and quarry clean-up. *Model 18-A, 1 yard,* is adapted for special service—*trench hoes* for crevice cleaning upon serrated rock strata; *skimmers* for sand strata separation and recovery, etc. . . . We have had a long and varied experience in handling difficult and unusual excavation problems. Ask for bulletins.

ROCK SHOVELS
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BACKHOES
SKIMMERS
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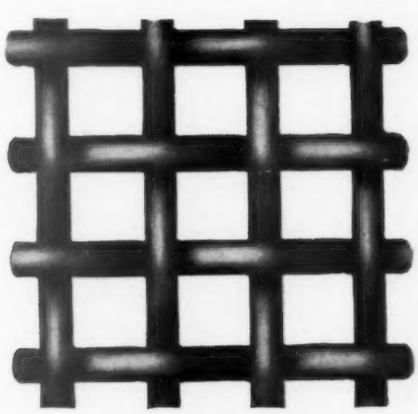

ROEBLING STEEL Assures Long Life

Roebling "Abraso" Screening is made of special steel—manufactured by *custom methods* in Roebling's own mill. It is steel that offers maximum resistance to the BEATING of stone and gravel.

To further assure long screening life, Roebling controls every step of manufacture from steel making to fabrication.

Roebling "Abraso" Screening is available for every sizing, cleaning and grading service.

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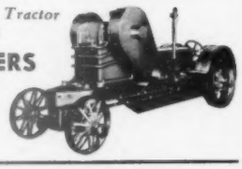
LARGE PRODUCTION
MINIMUM UPKEEP
FREE—Write for our 16-page Catalog and Specifications

Bronze or Roller Bearing
JAW CRUSHERS
Heavy Armor plate steel or cast steel Constructed
Large capacity
Small power Requirements

Self Traveling Tractor
JAW CRUSHERS
Ideal for maintenance road work

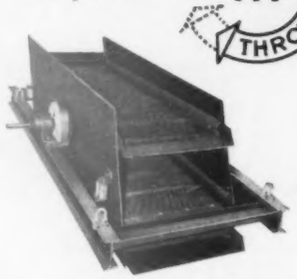


LIMESTONE PULVERIZERS
Stationary or Portable
Adjustable
Crushes Large Stone to 2" minus Down to Agricultural Dust
Built In (8 sizes)

Cross Section View of Pulverizer

GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS
GRUENDLER CRUSHER & PULVERIZER CO.
2915-21 N. Market St., St. Louis, Mo.

NEW HOLLAND
Vibrating Screen
CIRCLE NH THROW



This is the "Circle Throw" SCREEN that puts your grading on a "total production" basis at new low costs. A full range of sizes with one to three decks.

The New Holland Line:

Crushers
Pulverizers
Elevators
Screens
Conveyors
Belting
Engines
Furnaces
V-Belt Drives
Feed Mills
Electric Motors
Concrete Mixers
Dewaterers
Semi-Steel Castings
Gray Iron Castings
Power Mowers
Pick-up Bailing Presses

Ask for Bulletins

NEW HOLLAND MACHINE CO.
New Holland (Lancaster County) Pennsylvania

in contact with the liquid, including the check valves, are produced of alloys best suited to the specific service. Check valves are of ball, cone or disk type, and of composite design.

The pump unit employs a stuffing box of ample depth and diameter to retain the packing and prevent leakage. Stuffing box gland is fitted so as to provide a number of adjustments before it is necessary to repack the unit. Wear on the plunger is avoided by guiding the plunger top and bottom, while bronze bushings have been incorporated at bearing points where required. Where slight contamination from lubricants is not objectionable, pumps can be furnished with automatic force-feed lubricators, injection of oil being adjustable and synchronized with the functioning of the pumping unit.

Drives are normally motor, belt, sprocket or reciprocating, and arrangements can be made to incorporate other means of driving when desired.

An innovation in eye protection is the claim made for I-Gards, just introduced by the B. F. McDonald Company, Los Angeles. Said to combine the best features of spectacles and cup goggles, with the disadvantages of neither, I-Gards are molded of a special clear plastic that makes them nonshatterable, light and strong. The lack of frames and side-pieces affords unrestricted wide angle vision, yet provide protection from obliquely flying objects.

TRADE NOTES

The National Supply Company announces with regret the passing of Fred R. Lowell, its manager of engine sales. Mr. Lowell was a passenger on the plane of the Northwest Airlines enroute to Seattle, Washington, which crashed near Fargo on October 30.

Fred R. Lowell.

Mr. Lowell was affiliated with the National Supply organization in April, 1936, when he assumed charge of the company's commercial-engine sales in the Southwest with headquarters at Houston. In January, 1940, he was transferred to Springfield, Ohio, to become manager of oil field engine sales and occupied this position at the time of his death.

Following his graduation from the University of Wisconsin in engineering in 1926, Mr. Lowell joined Fairbanks, Morse & Company. In June, 1933, he was made manager of the Export Division Machinery Department of Fairbanks-Morse with headquarters in New York. He resigned this position in April, 1936, to join the National Supply Company.

•

The Barber-Greene Company celebrated the 25th anniversary of the founding of the company October 21, 1941, at a banquet. The theme of the celebration was expressed by W. B. Greene, vice-president and treasurer and co-founder of the company, in the introduction to his "History of Barber-Greene To Date," an illustrated talk full of anecdotes and philosophy.

"We are not celebrating age or size," Mr. Greene said, in part. "We are celebrating loyalties and personal relationships, and a contribution to the industrial and social life of the nation. Products unique answering specific needs that have helped to raise the nation's standard of living; helped to shift human service from long hours of back-breaking toil to shorter hours of more skilled service; tending to greater human dignity and greater life satisfaction for all."

•

The Pioneer Engineering Works, Minneapolis, announces the recent appointment of two new distributors. The E. F. Craven Company of Greensboro, North Carolina is the new dealer for North Carolina. James Ray Norton is the new dealer for the state of New York. Mr. Norton has been working in the New York area for 14 years and is well known to the trade. His address is 11 West Forty-second Street.

NEW
√ in Mobility
√ in Road Speed
√ in Digging Ability
√ in Low Upkeep

The new Model 75-W Haiss Loader on Pneumatic Tires will handle a lot of material from scattered stockpiles on NEW basis of bed-rock-minimum costs.

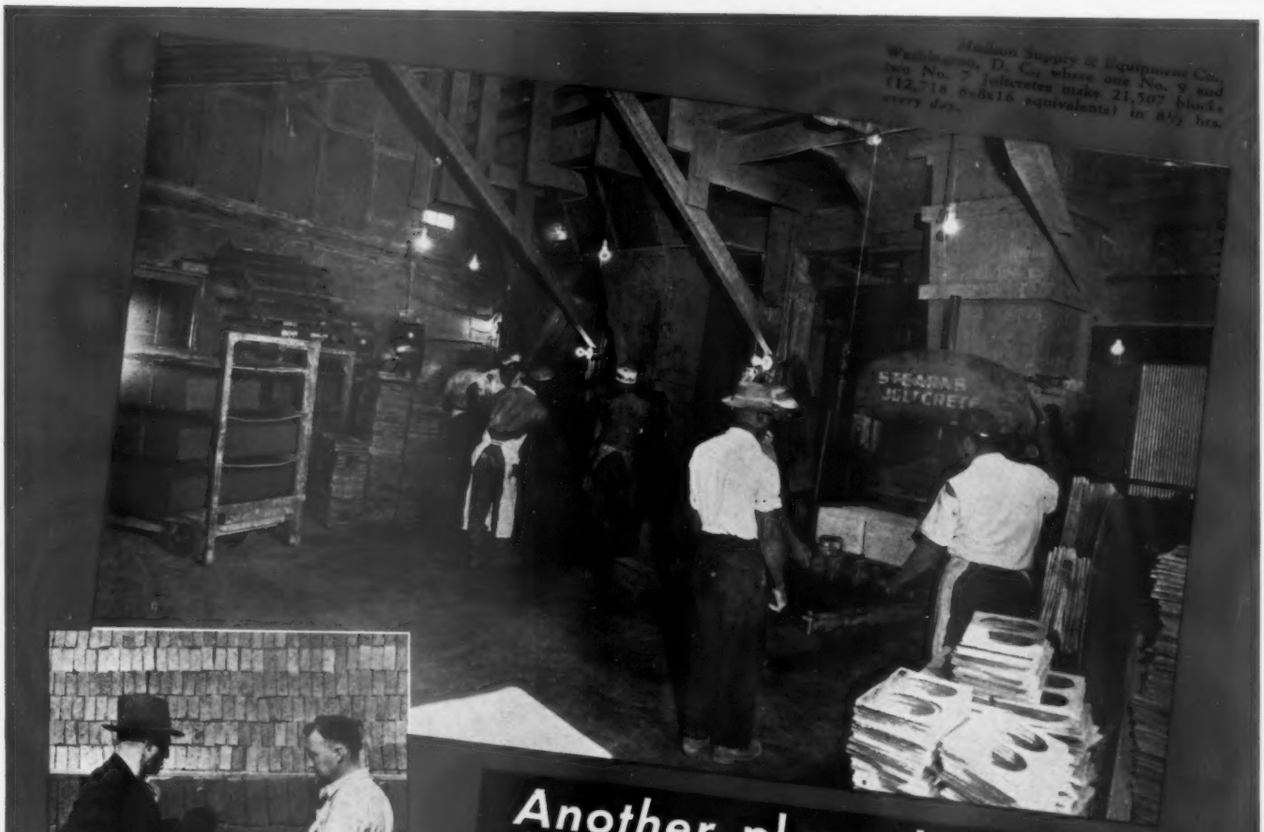
Ask for Bulletin No. 340

WRITE, WIRE OR TELEPHONE
HAISS
George Haiss Mfg. Co., Inc., 142nd St. & Rider Ave., New York
Who, for nearly half a century, have created and sold none but equipment of demonstrable superiority in design and manufacture.
Portable Conveyors—Clam Shell Buckets

December, 1941

The CONCRETE MANUFACTURER

A Special Section of ...



Madison Supply & Equipment Co., Washington, D. C., where one No. 9 and two No. 7 Joltcretes make 21,507 blocks (12,718 8x8x16 equivalents) in 8½ hrs. every day.

Left: E. Austin King, Mechanical Supt. Right: J. A. Fitzrock, in charge of block plant.

Mr. King writes: "Joltcretes give us maximum production at low labor and maintenance cost."

Another plant that requires THREE JOLTCRETES to satisfy the demand for these superior vibrated blocks

In buying, *play safe*—follow the judgment of such successful operators as Hudson—*remember that lower machine cost lowers cost on every block.* Buy **Stearns Joltcrete.**

STEARNS MANUFACTURING CO., ADRIAN, MICH.

The CONCRETE MANUFACTURER

December, 1941

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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To Produce Controlled Mix

New methods for the scientific manufacture of concrete have been installed by the Bridgeport Concrete Company, Bridgeport, Connecticut, according to John G. Schwarz, Jr., president. The installation, including special compensating scales, certain laboratory equipment, and a device for keeping a permanent graphic record of the contents of every batch, has been made by the Scientific Concrete Service Corporation of Washington, D. C., which will also provide technical supervision that will enable the concrete purchaser to obtain concrete "tailor-made" to fit his specific requirements.

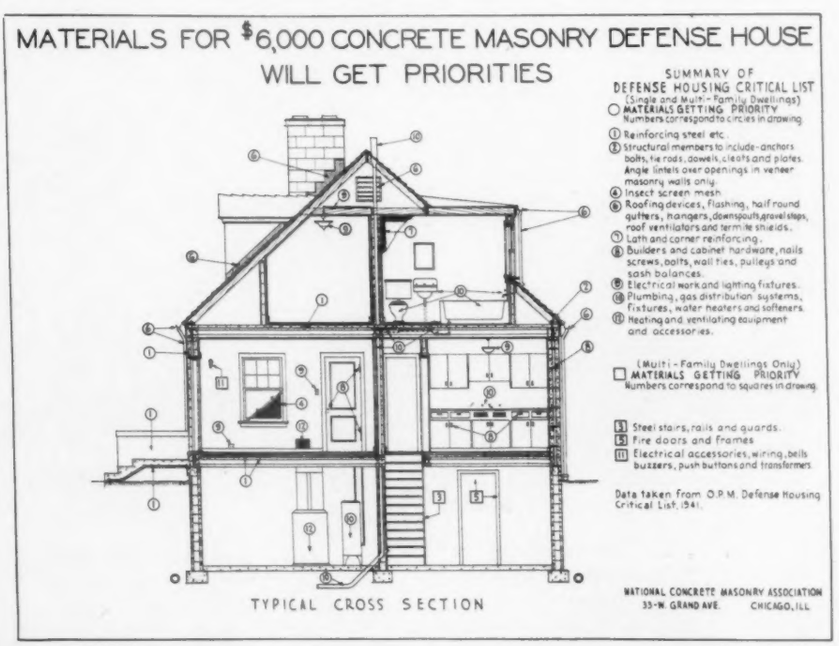
According to S. P. Senior, president of the Bridgeport Hydraulic Company, builder of the dam, "This system has made it possible to produce a stronger, denser and more wear-resistant concrete than ever before." Now the same concrete is available for the extensive building, both for defense and private interest, now going on in and around Bridgeport."

On all concrete jobs, whether in the field as at the Saugatuck Dam, or in the daily operation of a central-mixing plant, a troublesome problem is the control of the moisture in the aggregates used in making the concrete. Even when the exact amount of this moisture is known, there is an additional problem of compensating for it in every batch. Too much water reduces the strength of the concrete, and too little makes it unworkable. Through the new method the exact amount of excess water in the sand and gravel is determined without the necessity of drying or making calculations and is automatically compensated for. The graphic recorder automatically keeps a record of the contents of every batch, including the excess water in the sand and gravel, and this record is kept on file for future reference. Such a record has proved extremely valuable to city engineers and others concerned with public and private building.

Awarded Concrete Contract

Two Kansas City concerns, joining as bidders on account of the amount of equipment and material required. . . . The Stewart Sand & Material Company and the Ready Mixed Concrete Company . . . have been awarded the contract to supply the ready-mixed concrete on the $60,000,000 smokeless powder plant near Pryor, Oklahoma.

The plant will require nearly 90,000 yards of concrete, it is estimated. The concrete work will cover a period of a year. A supervisory force will be dispatched from Kansas City, but labor will be obtained in Oklahoma. A complete batching plant not now in use in Kansas City will be taken down and reassembled at the job.


MATERIALS FOR $6,000 CONCRETE MASONRY DEFENSE HOUSE WILL GET PRIORITIES
SUMMARY OF DEFENSE HOUSING CRITICAL LIST
(Single and Multi-Family Dwellings)
MATERIALS GETTING PRIORITY
Numbers correspond to circles in drawing
1 Reinforcing steel etc.
2 Structural members to include-anchors bolts, tie rods, dowels, cleats and plates. Angle lintels over openings in veneer masonry walls only.
4 Insect screen mesh.
6 Roofing devices, flashing, half round gutters, hangers, downspouts, gravel stops, roof ventilators and termite shields.
7 Lath and corner reinforcing.
8 Builders and cabinet hardware, nails screws, bolts, nail ties, pulleys and sash balances.
9 Electrical work and lighting fixtures.
10 Plumbing, gas distribution systems, fixtures, water heaters and softeners.
12 Heating and ventilating equipment and accessories.
(Multi-Family Dwellings Only)
MATERIALS GETTING PRIORITY
Numbers correspond to squares in drawing
3 Steel stairs, rails and guards.
5 Fire doors and frames
11 Electrical accessories, wiring, bells buzzers, push buttons and transformers.
Data taken From O.P.M. Defense Housing Critical List, 1941.
TYPICAL CROSS SECTION
NATIONAL CONCRETE MASONRY ASSOCIATION
33-W. GRAND AVE. CHICAGO, ILL.

Cross-section of a $6,000 typical concrete-masonry house entitled to priority rating. Prepared by National Concrete Masonry Association.

Automatic Machinery Plays Lead Rôle in Geist's New Concrete-Block Plant

A general view of the Geist property as seen from across the street.

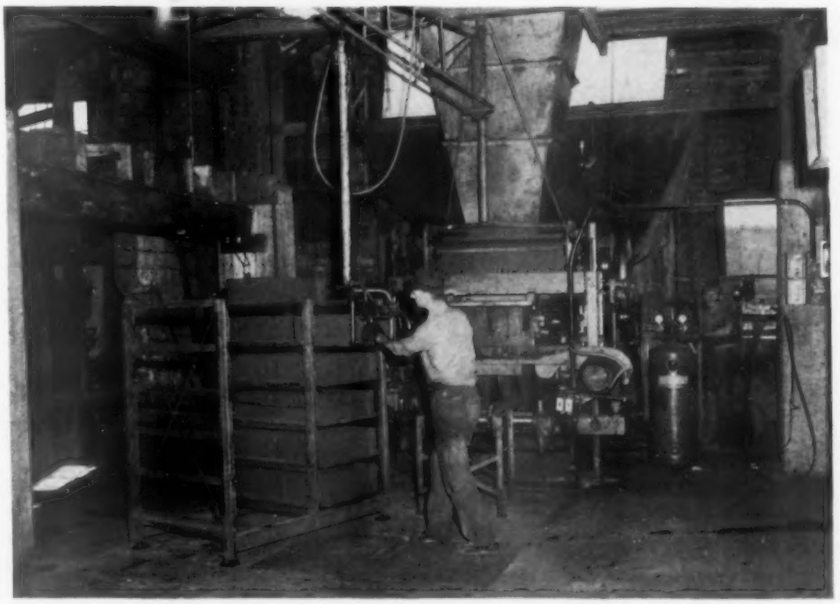
By HARRY F. UTLEY

SOON after the dawn of the twentieth century Cleveland builders discovered that a fellow by the name of Giest was making an inexpensive building unit called a "cement block" that was ideal for laying up foundations, footings, etc. Herman F. Geist was a pattern-maker by trade and he designed and built the wooden molds into which the concrete for the blocks was poured. When hand-operated machines became available, Mr. Geist installed a couple to step up production and, later on, he began using some of the early power-driven tampers and mixers in the plant structure he had erected in 1911 on Cleveland's southwest side.

As the demand grew, more equipment went into service with the result that the concern, now known as the Geist Coal & Supply Company and composed of three sons and a daughter of the founder who has since passed away, awoke shortly to realize that it had a plant full of antiquated equipment that was costing entirely too much to operate. The wisest plan, of course, was to junk the old, inefficient equipment and the Geists were foresighted enough unanimously to agree on such a course. As a result, a modern highly-mechanized manufacturing plant began producing quality concrete units in September of this year. Full advantage has been taken of the newest developments available to the industry to assure high output per man-hour and controlled quality of the product. Human energy is utilized only to control the operation of the machinery; all the aggregates, cement, green and cured blocks are handled mechanically even to the loading of the blocks on trucks in the yard.

Both sand-gravel and Haydite units are made, the latter being marketed as "Geistone". The natural aggregates come from pits near Akron and are shipped in railroad cars. This plant uses a blended concrete sand with about 25 per cent. of pea gravel added. The manner in which these aggregates are loaded is interesting. The correct amount of pea gravel is placed in the car first with the sand on the top. As the hopper gates are opened to discharge the material into a receiving pit, the weight of the sand sloughs off the gravel in just the right proportion to assure a good mixture. A bucket-elevator carries the material 60 feet upward to a 150-ton Blaw-Knox steel bin at the top of the plant. This bin has two compartments, one for the sand-and-gravel mixture, the other for Haydite. The same elevator brings up the Haydite, which is trucked in from the Haydite branch plant near Cleveland. Cement in cloth bags is carried by an inclined cleated belt-conveyor from trucks or cars up to the mixing floor. Two Blaw-Knox volumetric batchers, one for sand-gravel and one for Haydite, measure out the aggregates and discharge them into a 42-cubic foot Besser batch-mixer. Cement is added from sacks and the proper amount of water introduced by an automatic measuring tank.

Beneath the mixer is the new Besser Vibrapac machine which now makes all the units. Producing about 10 standard 8-inch units per minute, it has a greater output than a half-dozen of the old machines and at the same time makes a far better, more uniform unit than was formerly possible. Special sizes, too, and concrete bricks, 32 at a time, are regularly being made on the Vibrapac. The air-operated off-bearing hoist eliminates lifting the blocks and makes it easy for one off-bearer to transfer the equivalent of three standard blocks on a single plain-steel pallet to a rack as fast as they are molded.



The new block machine and air-operated off-bearing hoist.

View showing the 12 curing rooms.

The racks are of steel, without cross-bars, and were designed by the company to accommodate the large pallets. Each holds 72 standard units, or the equivalent in smaller or larger sizes.

Curing is done in 12 steam tunnels each 31 feet long and each holding nine racks with only a few inches of waste space, so that the heat and moisture are completely utilized. The floors and roofs of the curing tunnels are of concrete and the walls are of concrete masonry. The so-called "yard ends" are nonexistent in this plant, being walled-in with concrete masonry, the cured units being taken out through the same opening as that through which the green blocks are brought in. This is in accord with the best modern practice, since it has been found that opening the "yard ends" cools off the kilns rapidly, especially in cold weather, and wastes considerable of fuel.

Probably the most interesting phase of the Geist operations, however, is in the handling of the blocks from the Vibrapac until they are loaded, fully-cured, for delivery on the job. Two Towmotor gasoline-powered fork-lift trucks are employed in this service, a Model LT-46 and a Model LT-44. Each is driven by a 4-cylinder Continental engine, is ridden by an operator, and has a hydraulic load lift of 7 feet. The

A rack-load of freshly-cured blocks being placed up on the pile.

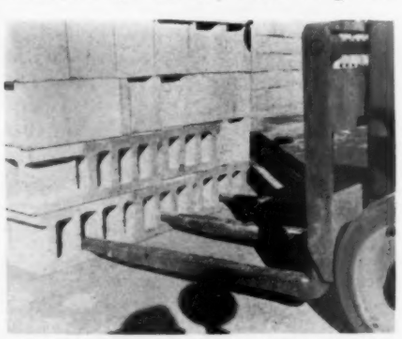
Lift-truck in one of the curing rooms. Note absence of waste space.

LT-46 unit is used to handle the blocks from the Vibrapac in and out of the curing tunnels, and out into the yard. The other unit loads the blocks on trucks and does other service.

The LT-46 machine operates with clock-like precision on the following schedule: (1) it takes a loaded rack of blocks from the Vibrapac and places it in a kiln, (2) backs out and enters a kiln of cured units and brings out a rack-load into the yard, lifting it as high as necessary, and depositing it for unloading, (3) picks up an empty rack in the yard and returns it to the rear of the Vibrapac where the pallets are removed, and (4) returns the rack around to the front of the machine for reloading. This complete cycle has been timed to take just about 7 minutes and, since the Vibrapac turns out 10 standard units, or the equivalent, per minute, the off-bearer usually just gets a rack-load of 72 blocks ready for the return of the Towmotor to begin another cycle. There is, therefore, no lost motion, no idle time for men or machines. The truck operates economically and enables 1 man to do the work of 5 or 6 men, were ordinary hand-drawn lift-trucks employed.

Superintendent E. K. Geist and his brother Harold F. Geist, president of the firm.

The Model LT-44 Towmotor likewise will save time and cut costs in the storage yard. The blocks are to be stacked in an unusual pattern. One layer will have the core holes lying horizontally. The next five layers are to be stacked conventionally with the core spaces standing vertically, but with each layer at right angles to the other, the weight of the units holding them together. This lift-truck is equipped with three forks, each 39 inches long and spaced to run into the horizontally-placed cores of the bottom layer of blocks. A slight tilt toward the Towmotor, and a solid cube of 90 units is taken off the pile and placed on a waiting flat-bed motor truck. This is quickly accomplished in an impressive manner, since the 90-unit load may be lifted as high as 7 feet and the Towmotor can be easily maneuvered. The time and labor saved by this modern method of



This picture shows how the forks enter the block cores.

How the blocks are brought to the flat-bed truck and quickly loaded, 90 at a time. These pictures were taken while experiments in stacking were still in progress which accounts for the lack of uniformity in the piles.

loading, in contrast to hand loading a block at a time, will, of course, be enormous.

The same LT-44 unit is also employed to store surplus cement. As mentioned, cement is received in railroad cars or trucks. When the storage capacity on the mixing floor is reached the Towmotor brings out a wooden skid, raises it to the level of the cement truck or car floor and the bags are piled, 24 to a load, on the skid. The Towmotor unit then carries the loads inside the plant and stacks the bags, one skid-load above the other, until they are needed. The procedure is then reversed, the loads being returned to the cleated conveyor to be carried up to the mixer. Here, again, the expense and bother of rehandling by hand are eliminated.

The company makes a variety of other precast-concrete products including chimney caps, pier blocks, sills and lintels. A 1-bag Blystone mixer is used to prepare the concrete. Recently a special lintel 13 feet long was cast and delivered for use in an office building.

Prices for concrete products are currently good in the Cleveland area and the demand, because of defense-program construction, is exceptionally heavy. Sand-gravel blocks are delivered at a list price of 14 cents each, with Haydite a cent higher. Two 8-hour shifts are regularly working.

Three sons and a daughter of the founder now manage the business. H. F. Geist is president and general manager, I. C. Geist is vice-president, E. K. Geist is superintendent, and Mrs. W. R. Stuart, office manager. Frank Vlasek, foreman, has the longest record of continuous service. He was the late Herman Geist's first employee and at a recent company-sponsored social gathering was presented with a fine clock bearing a suitable inscription commemorating his lengthy service.

Batching the aggregates into the mixer.

While the manufacture of concrete products has always been the principal part of the business, the company for many years has also been in the retail coal business and dealt in a complete line of builders' supplies as well. Ample stocks of blocks are constantly maintained. The company does an aggressive merchandising job, its advertising program being directed by the Cleveland office of the Bayless-Kerr Company.

The 42-cubic foot batch mixer.

One of the trucks handling a skid-load of cement.

Some of the cement in storage, 45 bags to a skid.

The CONCRETE MANUFACTURER

Pioneer Irrigation-Pipe Maker Now Operates Chain of Plants

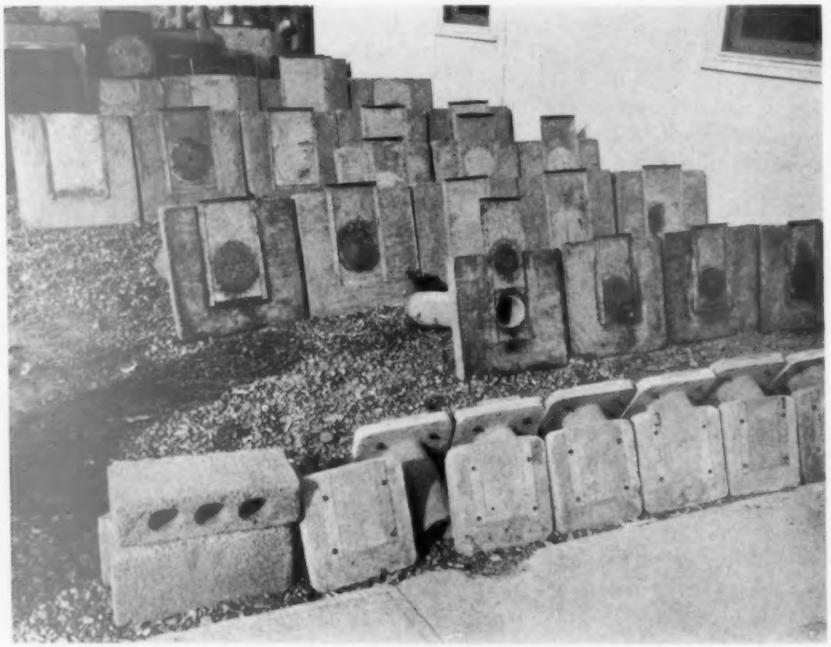
ONE of the industrial pioneers of the west is Claude E. Bingham, who in 1909 began manufacturing concrete irrigation pipe and concrete blocks at Ontario, Oregon, which is about 45 miles northwest of Boise, Idaho. Ontario was then only a small village on the Snake River which, at this point, is the boundary between Oregon and Idaho. The extensive irrigation program which was then beginning to make this a thriving fruit-growing and farming section had just been started.

Since then this area has grown considerably in population and in prosperity and Mr. Bingham's enterprises have grown with it. In 1929 he started the Concrete Pipe Company at Twin Falls, Idaho, 144 miles southeast of Boise and the Caldwell Concrete Pipe Company at Caldwell, Idaho, 30 miles west of Boise. In 1934 he took over the Boise Concrete Pipe Factory in Boise. In 1937 a temporary plant was operated at Nampa, Idaho to supply concrete pipe for a P.W.A. project. The latest important development was the construction of a new plant at Ontario in 1938 to replace the original plant of the Ontario Concrete Pipe Company.

With this chain of plants Mr. Bingham is now supplying most of the concrete pipe and blocks for a large part of southern Idaho and eastern Oregon, an area of about 75,000 square miles. This territory extends from Baker, Oregon to 80 miles east of Twin Falls, a distance by highway along the Snake River of nearly 400 miles.

The sand and gravel for the Ontario plant are purchased from local producers and are dumped from trucks into piles from which they are fed by wheelbarrows into a Blystone 7-cubic foot mixer. As the top of this mixer is at floor level it is covered with a hinged protective grating. Cement is added from sacks. The concrete is discharged from the mixer into a skip bucket which discharges it into the pipe machine. This is a recent model Tuerck-Mackenzie tamper which makes pipe from 4 to 27 inches in diameter in 2½- and 3-foot lengths and in both tongue-and-groove and bell-and-spigot types. Larger pipes up to 54 inches in diameter are also made in Tuerck-Mackenzie forms with electric vibrators. Tuerck-Mackenzie 2-wheel off-bearing carts are used to move the finished pipes into steam-curing rooms. After 3 days the pipes are moved outdoors where they are wet-cured for 10 more days before they are sold.

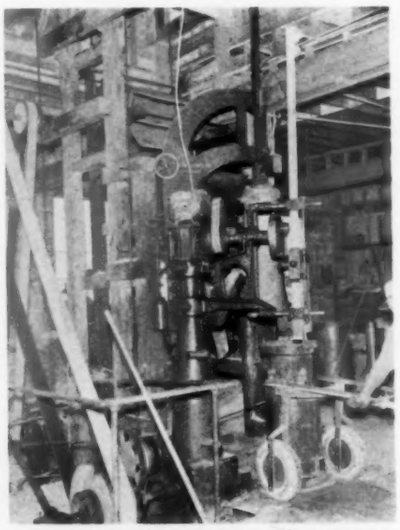
The concrete pipes made in this plant are used mainly for irrigation but some are also sold for culverts, for drainage and for sewers. A special end gate for irrigation pipe-lines is also made by hand. This consists of a one-piece sliding metal gate imbedded in a concrete head wall with a section of pipe bonded into it. Concrete blocks are no longer made at this plant.



Some of the one-piece metal head-wall sections produced at the Ontario plant.

Earl Bull, secretary, and President Claude Bingham.

This plant and its predecessor have had much to do with the growth and development of this part of the state. The growth of Ontario is typical of this section. In 1920 its population was less than 2,000 and now it is nearly 4,000 and is growing more rapidly than ever before. This is due largely to the completion of Owyhee Dam, 35 miles south of Ontario, which opened thousands of additional acres of land to cultivation. Fruit was originally the principal product but recently sugar beets and potatoes have become important and general agriculture is increasing.



Pipe-machine in the Ontario plant with off-bearing cart in position.

At the Boise plant a concrete equipment face-down block machine is operated. The concrete from a drum mixer is fed to a hopper over the machine by a skip bucket. A crew of 3 men produces about 600 blocks daily. Sand-

and-gravel and cinder blocks are made, the former being used mainly for warehouses and garages. The cinder blocks are used principally in houses and are covered with either stucco or plaster. A Duntile machine at this plant is used to make drain tiles. There is also a hand-operated brick machine and a 2-hole block machine. A Syntron electric vibrator is attached to this machine to make a better product.

All the cinders used in making blocks at the Boise, Ontario, Nampa and Twin Falls plants are processed at Boise. They are obtained from several volcanic deposits near Nampa. There is obtained also a tufa or volcanic ash which makes a nearly white block. Both red and black cinders are available but only the red are used. These make a light gray block with a pinkish cast. Both the tufa and the cinders make a very light block with high insulation value. These materials are sized over a stationary wire screen to which is attached a Syntron vibrator. No crushing is necessary. These materials weigh about 1,600 pounds per cubic foot and are used with about 1 part of fine sand to 6 parts of cinders or tufa. Seventeen or eighteen blocks are obtained from a sack of cement and these average well over the 1,000-p.s.i. requirement for Class A block in Boise and other centers. Standard 8- by 16-inch blocks made from these materials weigh only 35 pounds compared to 50 pounds for the sand-and-gravel blocks.

Pipe machine used in the Caldwell plant.

At Caldwell the company operates a sand-and-gravel plant with a capacity of 150 cubic yards daily on 3-shift operation which has been necessary lately. This material is elevated and screened into bins, from which it can be sold or fed direct into the 7-foot Blystone mixer in the concrete-products plant. The concrete is elevated to an old Tuerck-Mackenzie tamper pipe machine which makes both types of pipes in diameters of from 4 to 27 inches. Pipes over 36 inches in diameter are made in molds with a Syntron electric vibrator. The pipes are hauled and cured in the same way as in the Ontario plant, where gates are also made.

Mixer and hoist serving pipe-machine at Ontario. Note safety grating over the mixer blades.

A similar combination of sand-and-gravel and pipe plants is operated at Twin Falls. Recently a block machine was installed there and a block machine is now being operated at the Nampa plant.

Mr. Bingham is president of all the companies mentioned. H. D. Jennie is vice-president of the Ontario company and secretary of the Twin Falls company. Earl V. Bull is secretary of the Ontario and Caldwell companies.

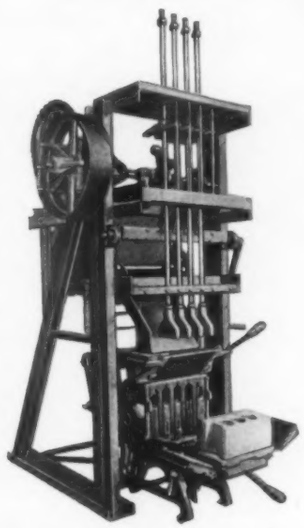
• Concrete Paint

Manufacturers of concrete building units frequently ask for information on the best type of paint for concrete, cinder and light-weight aggregate blocks and concrete brick.

Concrete building units are a painting problem because the surfaces are usually quite rough, making them difficult to paint with ordinary paints. Oil paints usually dust, peel or scale off due to the fact that water dissolves the alkalies which act on the oil in the paint, causing saponification of the paint.

To meet this need, the Medusa Portland Cement Company is offering Medusa Portland Cement Paint—a paint with a triple-ground Portland-cement base that bonds permanently with concrete, stucco or masonry surfaces. Portland-cement paint, properly applied, overcomes the difficulties in painting a block wall. Being made with a cement base, it bonds naturally with the cement in the block and mortar and gives a permanent, hard, cement-like finish that helps to keep moisture from entering the block or mortar and freeze, causing deterioration.

Products makers are urged to get two free informative books, *Better Concrete Products*, and *How to Paint Concrete, Stucco, Masonry and Other Surfaces*. These will be sent without cost merely by addressing the Medusa Products Company, 1001 Midland Building, Cleveland.



Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio

No one ever bought Commercial Pallets the second time—unless he had orders for more blocks than he could handle on the Commercial Pallets he already was using. The reason they do not buy them the second time is because they do not need to. The original purchase of steel, Close-Clearance Pallets lasts a lifetime. You do not lose them by breakage, bending, cracking, warping, or any of the many other things that happen to wood, cast-iron or malleable pallets; and besides that they are all cored, easy to handle, light in weight, hasten the curing time.

Buy and be convinced of these facts

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN, OHIO

MONORAIL SYSTEM HANDLES BLOCK RACKS

Hoist which takes loaded racks from the block machines and transfers them to the kilns by overhead monorail.

BOTH loaded and empty block racks at the plant of the Grand Rapids Builders' Supply Company of Grand Rapids, Michigan, are handled by an overhead monorail system instead of the usual lift-truck method.

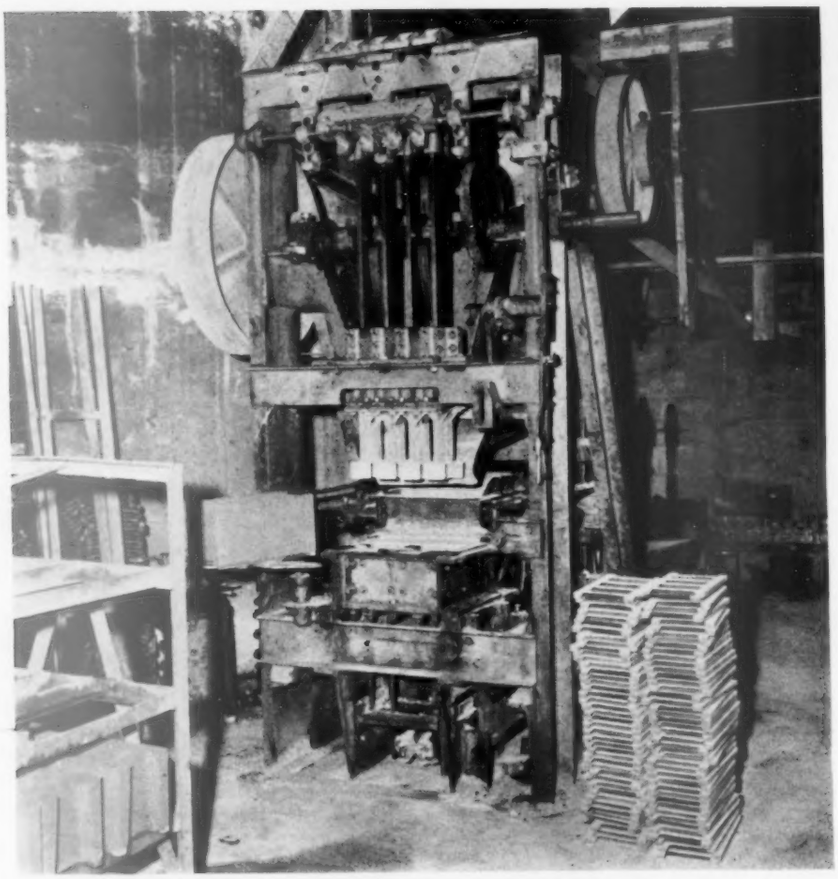
A hand-chain-operated Wright hoist moves on two parallel overhead tracks in front of the block machines and picks up the loaded steel racks. These are transferred, at right angles to the parallel tracks, directly into either of two curing tunnels *via* the monorail system. There are two monorail tracks in each curing tunnel to allow the placing of two rows of racks for curing. The system extends into the covered storage yard and is amply equipped with switches and curved sections so that any part of the yard may be reached efficiently. More than 700 feet of track is installed.

Both gravel and Pottsco light-weight blocks are manufactured, all the aggregates being purchased. The latter are elevated to a concrete cylindrical compartment bin.

The batch mixer which feeds both block machines.

The main production machine is a power-operated Multiplex Super Tamper, capable of turning out 300 to 350 standard 8- by 8- by 16-inch units per hour. This machine was put in service about three years ago. An older Anchor tamper is also used for the making of "specials." A Multiplex Multimixer of 12-cubic foot capacity prepares the concrete for both tampers and is located equidistant from them. It is equipped to discharge at either end to feed, through chutes, either block machine. A hand-operated Multiplex flue-block machine, located in a shed adjoining the block plant, makes a variety of chimney blocks, the demand for which seems to be growing. In this shed, other special concrete units such as sills, lintels, etc., are also poured.

The Grand Rapids Builders' Supply Company handles a complete line of building supplies and has been serving the construction industry in the "furniture capital of the world" since the turn



The main block-production machine and some of the cast-iron pallets.

Plant and covered storage yard of the Grand Rapids Builders' Supply Company.

View under the roof in the storage yard. The monorail track and one of the switches may be seen.

of the century. It has made its own concrete blocks for about 30 years and has, of course, revamped its production methods and equipment many times as better machinery and improved technique in block manufacture became available.

Establishes New Block Plant in Illinois

A new plant has been erected at Elkville, Illinois by the Building Products Company for the manufacture of concrete blocks.

STONEX
Concrete Floors
—•—
The De Luxe Tile of Distinctive Style
—•—
ALL COLORS
ALL SHAPES
ALL SIZES
HARD as granite
EASY to place
LOW in COST

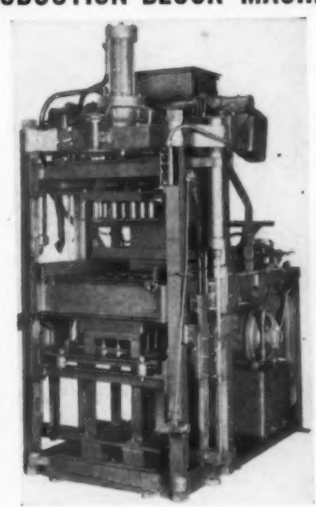
YOU CAN NOW BECOME AN AUTHORIZED STONEX LICENSEE FOR: $650
(Equipment, Sales Helps Included)

Start with STONEX as a sideline, and it will soon be the main stem of your business.

Write for details

STONEX INDUSTRIES
500 N. W. 79th, Miami, Florida
33 N. La Salle St. . . . . Chicago

Why not BUY
the LATEST
FASTEST
and BEST
PRODUCTION BLOCK MACHINE



HYDRAULIC
VIBRA PRESS
Write for information.

KENT MACHINE CO.
Cuyahoga Falls, Ohio

FOR SALE
READY MIX PLANT
Consisting of 1—56-S Rex mixer, Johnson bins, weighers, and batchers, cement hoppers, elevators, heating system, all electric motor driven. All structural and wood housing included. Immediate delivery.
WRITE WIRE PHONE
MACHINERY & SUPPLIES CO.
1732 Grand Ave. Kansas City, Mo.

FOR SALE
ROOFING TILE MACHINE — power driven. French and Spanish patterns. Forms for all specials. Excellent Condition.
CRUSHER—24" Cornish rolls. Also 3 ft. x 10 ft. rotary screen.
CONCRETE BUILDING UNITS COMPANY
34th & Roanoke Rd. Kansas City, Mo.

FOR SALE
One Used Besser Tamping Machine, with 4", 8" and 12" attachments and Besser Steel Pallets for same. This Block Machine is in fine condition having been completely overhauled in 1940 by the Great Lakes Engineering Company of Detroit, Michigan. Further information and price may be obtained by letter or visit to plant, 45 St. Jean Avenue, Detroit, Michigan.
BLOCK AND BRICK, INC.
Detroit Phone—LEnox 6300 Michigan

BRICK PALLETS
For Sale
2500 Commercial Shearing, rolled edge steel pallets. Size 9"x30". ALL NEW.
20 STEEL CARS FOR ABOVE PALLETS. 24" Gauge.
E. B. KELLEY, INC.
17th & Glenwood Ave. Philadelphia, Pa.

VISIBLE MIXING . . . On the Level

Stand on the Ground and SEE the Mix . . .

On the level, only Smith-Mobile gives you REAL visible mixing. No need to climb up on top of the machine and peek through the feed chute. Just open the discharge door as far as you wish and look inside . . . even from ground level. No concrete will come out until you reverse the drum. Smith-Mobile gives contractors the opportunity to inspect the batch before any of the concrete is discharged. Ready mixed concrete customers everywhere are now asking for visible mixing. And they also like the other Smith-Mobile features — high discharge — controlled discharge without segregation — water through the feed chute—no hatches to open or close — mix and shrink while charging, etc. Write for Catalog 198-B.

The T. L. SMITH COMPANY
2887 N. 32nd St. Milwaukee, Wisconsin

SMITH-MOBILE *The Original High-Discharge* **TRUCK MIXER & AGITATOR**

How You Can Solve HIGH PRICES and SHORTAGES

In essential materials used daily in tremendous volume by the building industry.

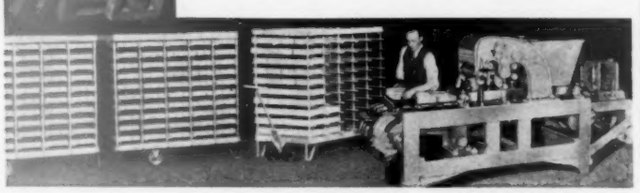
We equip you with special line production machinery—using local low-cost raw materials—only modest investment required—balance easy monthly payments.

Scores of established manufacturers have proven the quality and salability of product, as well as the earning power and stability of this business. (Names on request.)

This opportunity offered only one man in each community to make this proven low-cost material. (Samples furnished.)

Act now while your territory is still open. Write or wire for Free Books and learn how you too can own one of these profitable businesses.

W. E. DUNN MFG. CO.
420 W. 24th St. Holland, Michigan



NEW LOW COSTS! in Block Production

Nothing Equals the Combined VIBRATION and PACKING of

PAK-CRETE

Write TODAY for illustrated folder, details, prices. Compare for yourself.

KRAMER PRODUCTS CO.
Industrial St. Peoria, Illinois

HOW TO HANDLE RAW MATERIALS *AT LESS COST*

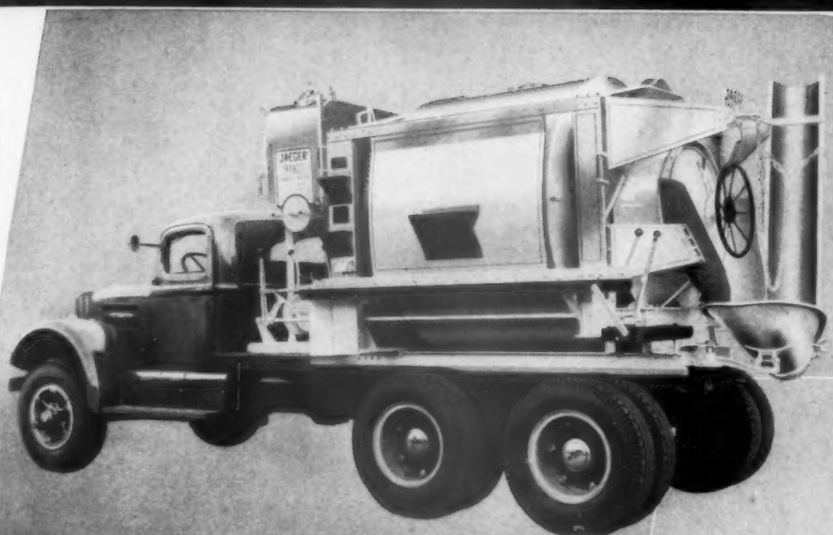
1 Neff & Fry storage bins speed up handling . . . eliminate waste . . . step-up convenience . . . free men for other duties.

2 Neff & Fry bins provide a storage "reserve" . . . act as a "cushion" for smooth flow of materials.

N & F bins are quickly erected. Maintenance free. Thousands in service. Write for details.

THE NEFF & FRY COMPANY
Camden, Ohio

Only JAEGER Equips You to Meet EVERY Ready-Mix Demand

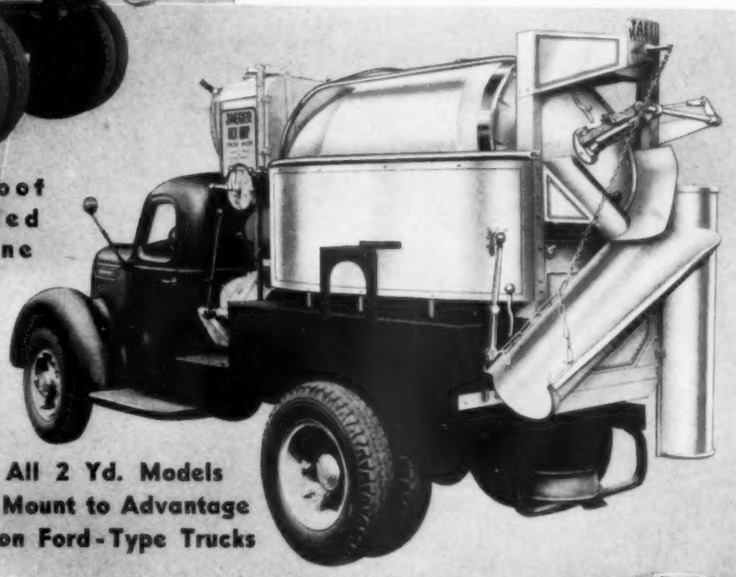


1.

All Jaegers Have 2-Speed Shock-Proof Transmission—Vacuum Cab Controlled Truck Engine Drive or Separate Engine

Standard LOW CHARGE

Type: Lowest, most economical to load; fastest on the market to mix and discharge — produce maximum daily yardage of proven higher strength concrete. Sealed drum meets any specification. Sizes 2, 3, 4, 5, 5½ yds.



2.

All 2 Yd. Models Mount to Advantage on Ford-Type Trucks

HIGH DUMP Types:

(2) Top Loading Models with "Sealed Drum"

(3) Or Combination Top and End Loaders (Pat'd)

Far outselling all other high discharge truck mixers today because they are fastest to load, mix and discharge any slump concrete — and are the only high discharge truck mixers that meet every specification and job condition.

"Sealed Drum" Models take full load in one quick drop through the top. Fast Vacuum-Controlled Discharge Door seals against loss of moisture and heat in winter concrete.

Jaeger End Loading Hopper Attachment (specially adapted to older or temporary plants not equipped for ribbon loading) offers many advantages over all other end loaders — and does not interfere with use of Top Loading Door where specified by engineers. (See details at right.)

Both types are built in 2, 3, 4 and 5 yd. sizes.

3.

Jaeger Charging-Discharging Hopper Attachment Permits Top or End Loading in Order to Meet Conditions - - -

The only end-loader which does not constrict drum opening and slow up charging and discharge. One quick turn of hand wheel opens Discharge Gate — no need to move entire Hopper (requiring many turns of a wheel) — no second seal to leak or wear.

JAEGER PORTABLE HOPPER

Saves Truck Mixers Waiting—Means 25% More Pay-loads per Day on Average Job. Tows to job behind truck mixer — takes full 2 or 3 yd. batches. One hopper serves almost any job.

THIS HANDY BLANK BRINGS YOU FULL INFORMATION:

Complete Data, Models, Specifications, Prices, Terms

THE JAEGER MACHINE COMPANY
602 Dublin Avenue, Columbus, Ohio

Send us newest information on ☐ Standard LOW CHARGE Truck Mixers, Agitators, ☐ HIGH DUMP Models, ☐ Portable Hoppers, ☐ Auto-Pavers and Spreaders, ☐ Pumps, ☐ Mixers, ☐ Hoists, ☐ Carts.

Name_____

Address_____

The CONCRETE MANUFACTURER

Experienced Operator Chooses MULTIPLEX

The Grand Rapids Builders Supply Co. is one of the nation's pioneer concrete-block makers. Since the turn of the century it has been supplying Grand Rapids builders with the best blocks it could possibly produce. Through the years it has used, discarded, or worn out a lot of machinery. Recently, when it needed a new, dependable high-production machine it unhesitatingly chose the improved MULTIPLEX Super Tamper. And, to assure MULTIPLEX quality throughout the production process, it also installed a MULTI-MIXER for faster, more thorough mixing of each batch.

The Multiplex Super Tamper is super modern in every detail, designed and constructed to produce the highest quality concrete block on a minimum cost and maintenance basis. The machine runs quietly and with little vibration. It has position-timed feeding and stripping, and quick-acting five-point clutches. Handles all types of aggregates. Capacity, 4 to 6 units per minute—no waiting between operations.

Write for Multiplex Catalog No. 41 for complete details about the dependable Multiplex Line

The Multiplex CONCRETE MACHINERY CO. Elmore, Ohio

MULTIPLEX Flue Block Spell "Extra Profits"

Multiplex Flue Block Machines are the answer to the current demand for concrete chimney units. Molds are available in all types, solid or ventilated, accommodating any type of flue liner. Grand Rapids Builders Supply Co. among the hundreds of satisfied users.

MULTI-MIXER . . . . for Fast, Thorough Mixing

The Multi-Mixer employs the famous reverse screw-type mixing action. Mixing is thorough and rapid. Friction relief makes paddles and liners last a long time. Sizes from 5 to 50 cu. ft. End, side or bottom discharge. Get the facts today!

MULTIPLEX

MAN POWER...or MAN and POWER?

Mass Handling for Mass Production with Towmotor

This "speed up" era teaches one important lesson . . . that efficient, profitable mass production demands a mass handling system of equal or superior capacity. Today's conditions point infallibly to the future pattern . . . mechanized handling to match the speed and efficiency of modern machines, to assure more productive use of expensive man power. And today's conditions are proving that Towmotor will fit that pattern best.

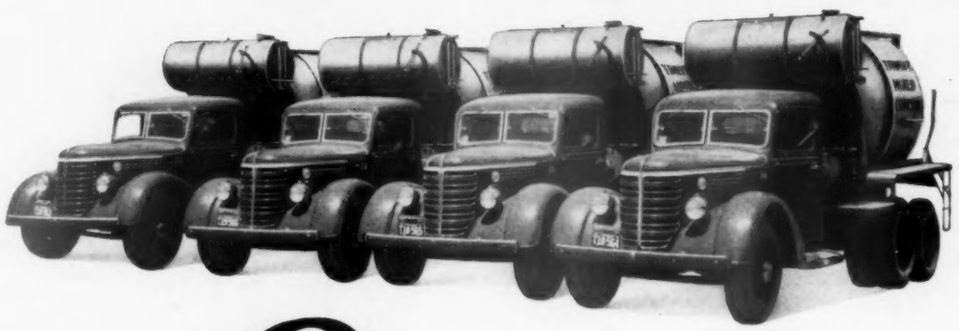
Towmotor picks up 1,000 to 10,000 lb. loads as "units" . . . hustles them to any part of your plant, warehouse or shipping platform in seconds . . . maneuvers them around in cramped quarters with amazing ease. Towmotor keeps materials ahead of production, spots loads exactly where wanted to avoid costly re-handling by skilled workers. In the warehouse Towmotor multiplies storage capacity by stacking up to 25 feet high, eliminates unnecessary handling in both receiving and shipping. One man and a Towmotor can rush through handling tasks that would overtax a crew of men. Yet, gas-powered Towmotor gives this service . . . 24 hours a day . . . for less than one man's wages. Man & power win . . . consistently.

If present circumstances show a need for improving your materials handling methods, ask Towmotor engineers for assistance. They will help you to develop a smooth-functioning, economical system that will keep pace with new methods, and adapt profitably to the needs of competitive years ahead. No obligation. Just write.

TOWMOTOR COMPANY
123-6 E. 152nd St., Cleveland, Ohio

Let TOWMOTOR CLEVELAND take the load off your hands

The 28th Ransome for ONE OPERATOR



This group of Ransome Truck Mixers

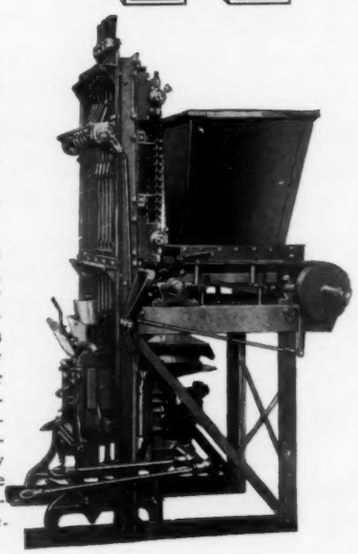
includes the 28th Ransome in this operator's fleet. Confidence in Ransome performance is reflected in repeat orders such as this. When next considering truck mixers it will pay you to investigate Ransome.

RANSOME CONCRETE MACHINERY COMPANY
DUNELLEN NEW JERSEY

Miles CONCRETE EQUIPMENT

simple as

A B C



It isn't how MUCH you invest that counts, but WHAT YOU EARN on your investment. MILES Concrete Products Plant Equipment will insure increased output, at lower first cost and lower operating cost.

MILES equipment is simple in construction, yet ruggedly built for the severest kind of service. Expert mechanics are unnecessary . . . any workman can keep your MILES equipment operating in first-class condition at all times. Investigate! Get the facts now . . write for a complete catalog of MILES machinery for the concrete-products plant.

MILES MANUFACTURING CO.
JACKSON, MICHIGAN

It is better to own a Sherman machine than to compete with one.

SHERMAN'S

Ball Bearing Concrete Pipe Machine, showing the sectional core which is the most economical core. By replacing only one section at a time which is a savings of 75% to the user.

Write for Prices and Information

SHERMAN CONCRETE PIPE CO.
KNOXVILLE, TENN.

Jeffrey

A NAME THAT STANDS FOR QUALITY—LONG SERVICE

Chains	Portable Loaders	Coolers
Conveyors	Car Pullers	Transmission Machinery
Bucket Elevators	Crushers	Portable Conveyors
Feeders	Pulverizers	Mono-veyor Storage Systems
Screens	Shredders	
Grinders	Dryers	

Write for engineering data

The Jeffrey Manufacturing Company
917-99 North Fourth Street, Columbus, Ohio

Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Huntington, Houston, Milwaukee, Pittsburgh, Philadelphia, New York, Scranton, Salt Lake City, St. Louis, Terre Haute

LOW INITIAL COST
LOW MAINTENANCE COST

ONE OF OUR MANY DESIGNS

Chase "all steel" Block racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work with your lift truck.

WRITE for Catalog and Special Low Prices

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

CHASE DRYER CARS & TRANSFER CARS

CHASE FOUNDRY & MFG. CO. COLUMBUS, OHIO

THE KIRKHAM VIBRATOR
is Producing Profitable Results!

The machine pictured here has produced approximately 120,000 blocks in five months.

This operator can charge off this investment now at three-quarters of a cent per block.

Production rate of 100-120 eight inch blocks per hour.

The high quality of these blocks has been a tremendous sales factor.

For full descriptive information on block machines, plant mixers, and truck mixers—write

CONCRETE TRANSPORT MIXER CO.
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QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with Quinn Pipe Forms. They can be handled by less experienced labor and produce uniform concrete pipe of highest quality. Quinn Pipe Forms make pipe conforming to A. S. T. M. requirements as to wall thickness and other standards.

Quinn Heavy Duty Pipe Forms are built to give more years of service — sizes for any diameter pipe from 12 to 84 inches — tongue and groove or bell end pipe — any length. Backed by over 30 years of service in the hands of contractors, municipal departments and pipe manufacturers.

HEAVY DUTY PIPE FORMS

Our Heavy Duty type with Adjustable Locks is shown above. Quinn Heavy Duty Forms are also available with a new wedge-type lock.

MEDIUM DUTY PIPE FORMS

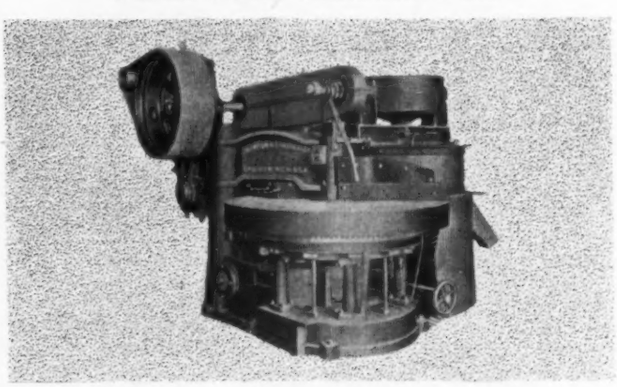
Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. For making pipe 12 to 60 inches in diameter —any length.

WRITE TODAY

Get complete information on prices and Special Construction Features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs. Also manufacturers of Quinn Concrete Pipe Machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12TH ST. BOONE, IA.

"It's really a BRICK!"
THE "J & C" PRESS
makes *better* Concrete Brick



Users say that they can make high quality concrete brick *faster* and *cheaper* on a "J & C" automatic machine.

All brick are accurately sized—have clean, uniform edges—are smooth textured, and high in strength.

Brick can be produced either vapor cured or high pressure cured. High pressure steam curing eliminates expense of yard stocking and aging. NO PALLETS USED.

Capacity of "J & C" Model "A" Machine, 3200 brick per hour. Capacity of Model "C" Machine, 1600 brick per hour.

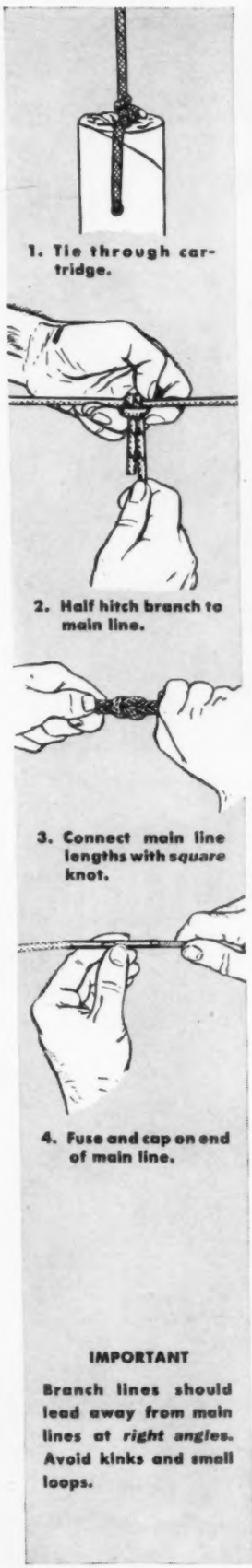
Write for Information.

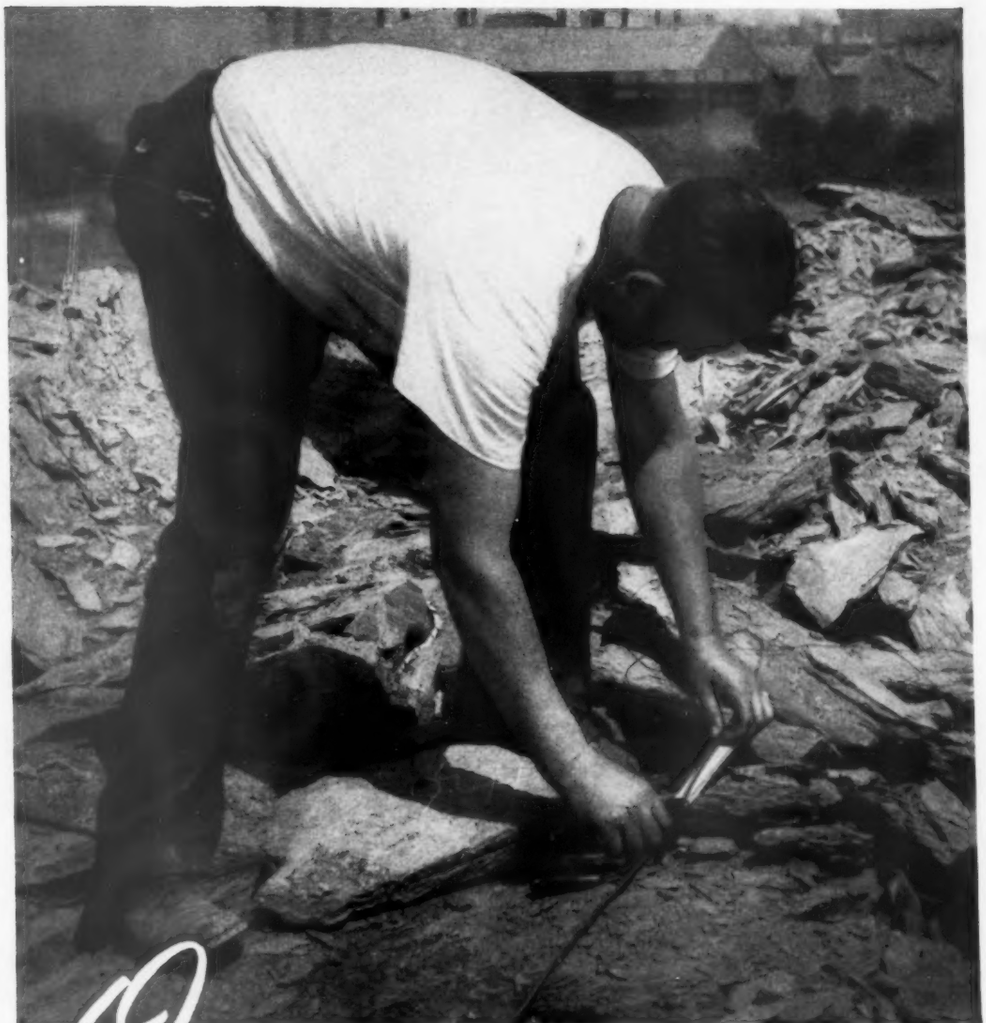
THE JACKSON & CHURCH CO.
Saginaw, Michigan

The Year-Long Advertising Medium for Your Products—1942 Edition Closes Dec. 15

Pit and Quarry Handbook offers complete sales coverage for a full 12 months . . . in a year that promises, because of our National Defense Program, to be tops in demand for basic building materials. Catalog your products in this one and only Buyer's Manual of the industry—reach every prospect who authorizes or approves purchases in 6,000 producing plants. Ask about the new Quick Mail Inquiry System, included for the first time in the 1942 edition. Assures more traceable inquiries for your advertised products.

PIT AND QUARRY PUBLICATIONS
538 SOUTH CLARK ST. CHICAGO


1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with *square* knot.
4. Fuse and cap on end of main line.
IMPORTANT
Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.



One cap does the work of a Thousand

A single fuse and cap or electric blasting cap, attached to the end of the trunk line of Primacord, will detonate the entire blast. The cap detonates the Primacord, releasing a detonating wave that travels at approximately 3.9 miles per second to detonate every cartridge in every hole. The use of Primacord obviates the need for blasting caps in the holes, and makes the hookup simple and labor-saving. Send for the Primacord Booklet—free.

PRIMACORD BICKFORD
Detonating Fuse

PB-39

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

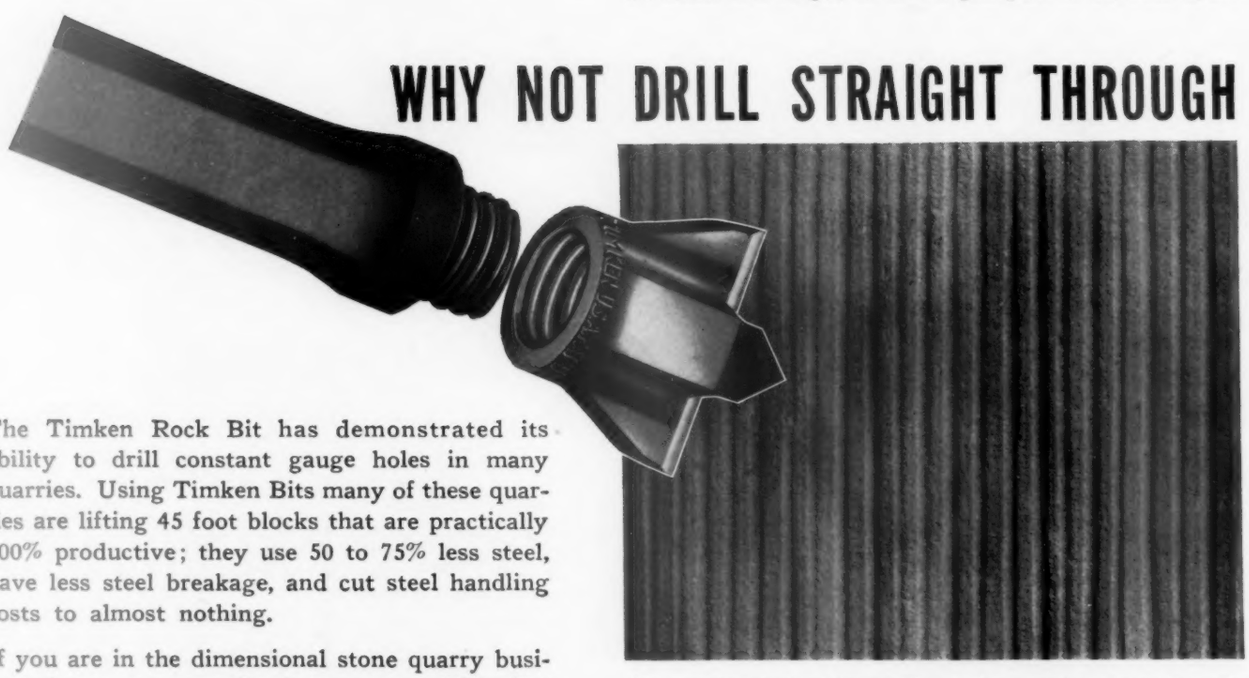
Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse since 1836

QUARRY OPERATORS

DO YOU STILL STEP 'EM DOWN

An exaggerated diagram of the results obtained with old-fashioned Bits forged as an integral part of the drill steel.

WHY NOT DRILL STRAIGHT THROUGH



An unretouched photograph of the results obtained with Timken Bits.

The Timken Rock Bit has demonstrated its ability to drill constant gauge holes in many quarries. Using Timken Bits many of these quarries are lifting 45 foot blocks that are practically 100% productive; they use 50 to 75% less steel, have less steel breakage, and cut steel handling costs to almost nothing.

If you are in the dimensional stone quarry business how can you afford to use anything but Timken Bits in the face of their amply demonstrated advantages?

Write us for further information—it won't cost you a cent.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROCK BITS

Keep THIS in mind for 1942

Brooks LOAD LUGGER

Trade Mark Registered

Keep THESE in mind:-

1. About 15 seconds for hoisting or dumping the load.
2. Unusually low headroom when booms are up.
3. Powerful double-action hoists.
4. Jackleg support relieves truck strain from overhung load while hoisting.
5. Correct load distribution forward of rear axle.

MORE PROFITS TO YOU IN '42 . . . if you modernize your methods of material handling with the Brooks LOAD LUGGER System.

It is America's popular dump-truck equipment that has proved its speed and economy on hundreds of jobs where loading is done by hand labor.

It is "up-to-the-minute" in design . . . sturdy in construction with a wide margin of strength . . . streamlined and simplified like a battleship stripped for action.

No rolls to clog . . . no cables to wear . . . no gadgets to break. Its toughness and stamina in service means longer work life and lower operating costs.

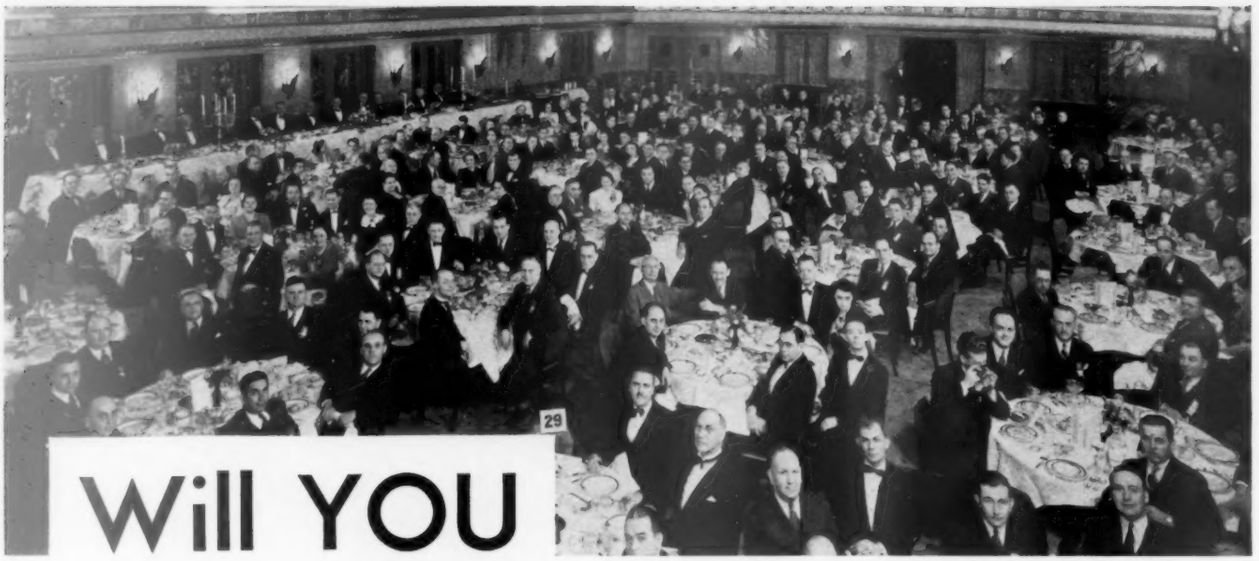
One LOAD LUGGER with 5 to 10 detachable buckets will give you the daily payload capacity of a whole fleet of ordinary trucks.

For road work, quarry operations, feeding crushers, construction jobs . . . you can cut costs by using a Brooks LOAD LUGGER mounted on your truck chassis.

Ask about our Special Introductory Offer

Brooks EQUIPMENT AND MFG. CO.

Distributors in all Principal Cities 112 Davenport Road KNOXVILLE, TENNESSEE



Will YOU be "in the picture" in 1942?

HERE ARE THE DATES

•

January 28, 29, 30

Twenty-Sixth Annual Convention of the NATIONAL SAND AND GRAVEL ASSOCIATION

•

January 29, 30

Twelfth Annual Convention of the NATIONAL READY MIXED CONCRETE ASSOCIATION

•

February 2, 3, 4, 5

Twenty-Fifth Annual Convention of the NATIONAL CRUSHED STONE ASSOCIATION

Plan now to be on the scene at the Netherland Plaza Hotel in Cincinnati when your association holds its annual convention (See dates at left). See the latest in machinery and methods on display. Hear about the newest developments in production methods, in merchandising, in research. Learn all about the defense program, priorities, what you can and can not do while your government goes "all-out" to insure freedom for all. Attend the open forums, participate in the discussions. Get a fresh slant on your problems. You're cordially welcome, irrespective of association membership. But make your hotel reservations NOW!

OSGOOD

TYPE 80 AIR CONTROL

The leader of them ALL for smooth, fast and efficient shovel, dragline or crane operation.

We have a brand new catalog awaiting your request.

THE OSGOOD COMPANY
MARION, OHIO

FOR THE NATION'S DEFENSE

DIAMOND is making astonishingly prompt deliveries on jaw crushers, roll crushers, portable or stationary complete plants, screens, belt conveyors, portable cranes, portable melting kettles, etc.

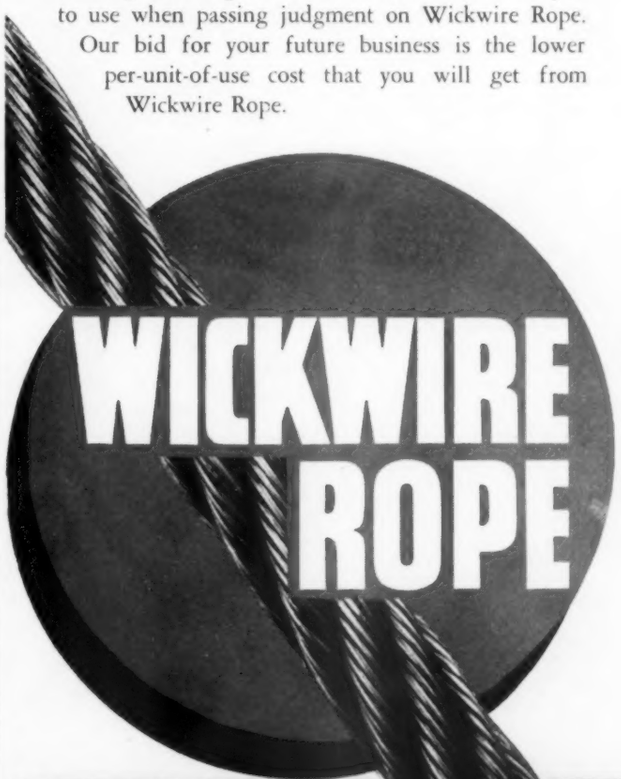
Our large trained engineering personnel together with extensive manufacturing facilities enable us to make these prompt deliveries of DIAMOND equipment for highway, ordnance plants, airport, and other construction jobs requiring crushed stone and aggregate. DIAMOND plants this year, have been playing an important part in this defense work the country over.

WRITE US TODAY

for bulletins or detailed information and prices on any rock, sand, and gravel crushing, screening, or conveying equipment.

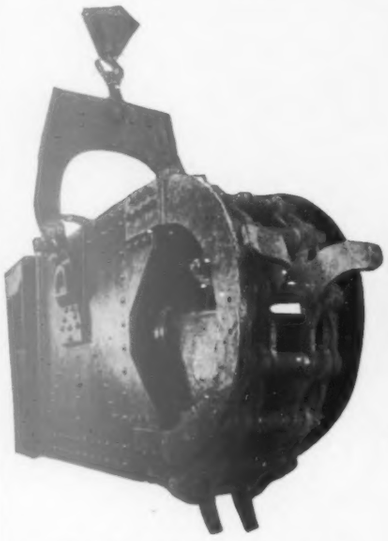
DIAMOND IRON WORKS, INC. AND MAHR MANUFACTURING COMPANY DIV.
MINNEAPOLIS, MINNESOTA

Use, not time, destroys wire rope. The oil man must think in terms of foot-hole-drilled, the building manager elevator car-miles-traveled, the logger the per-thousand-feet of lumber, the mine and sand or gravel operator per-ton or per-yard of material moved. The unit-of-use cost method is the only sound way of evaluating wire rope. It's the method we want you to use when passing judgment on Wickwire Rope. Our bid for your future business is the lower per-unit-of-use cost that you will get from Wickwire Rope.

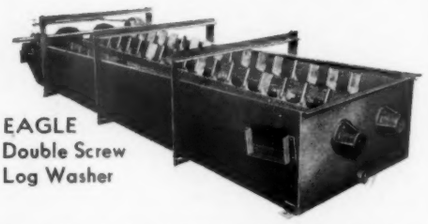


WICKWIRE SPENCER STEEL COMPANY
General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

Eagle
EQUIPMENT
LEADS IN DEFENSE



for Product Quality,
Efficiency and
Economy



EAGLE
Double Screw
Log Washer

EAGLE "Swintek" Screen Nozzle Ladder is an "ace in the hole" for every dredge operator. Works deep deposits and eliminates slug pumping. Reduces time, power and labor costs. Capacities increased up to 400%.

Write for our new Washer Bulletin, showing latest developments.

SAND AND GRAVEL PRODUCERS know that State and Federal specifications are "tightening up" due to defense construction requirements. Yet users of EAGLE Washers will be able to meet all demands for fine aggregate, however stringent, because of the low cost operation of EAGLE equipment.

EAGLE Washers are taking the lead in creating new operating economies. They are now available in several types and many sizes.

We are constantly designing new machines for special applications. Our engineers are at your disposal to help you attain "all-out" production.

EAGLE Double Roll Crusher
EAGLE Shale Planer

EAGLE Grinder
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EAGLE Dry and Wet Pans
Specialized Mining Equipment

EAGLE IRON WORKS
DES MOINES - IOWA

WELDED
ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED

"NOW WE'RE ALL HAPPY! —THE BOSS BOUGHT A NEW WILLIAMS BUCKET"

"I have been operating cranes for 10 years," writes A. G. Grupe, veteran crane operator for the Edison Fuel and Materials Co., Chicago, "and have never used a better bucket. The boss always has a big smile when he sees me come up with material spilling over the sides."

Operators and bosses all prefer Williams. Williams Welded Construction means longer wear . . . less breakage; faster work . . . more yardage! Williams buckets operate year in and year out with practically no cost for maintenance and repairs.

Distributors in all parts of the country.
Write for Free Bulletins on any of the 11 types of Williams buckets.

THE WELLMAN ENGINEERING CO. · 7014 Central Ave., Cleveland, Ohio

WILLIAMS *Buckets*
built by WELLMAN

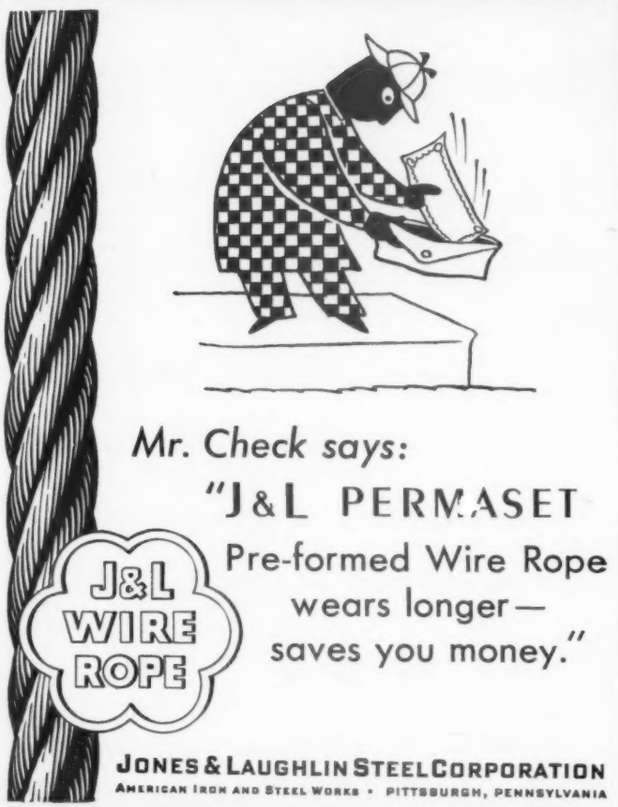
DEFENSE *Against* WEAR

Save wear on your hammers by protecting them with Coast Metals. This photograph shows a hammer surfaced with Coast Metal No. 112, after 155 hours service pulverizing glass cullet in a test against five competitive hard-surfacing materials, three of which were worn beyond effective operation after 28 hours. The other two lasted 8 and 14 hours.

This is a typical example of Coast Metals toughness under combined impact and abrasion. Write to us for advice on your pulverizing problems and we will recommend the right rod for your particular case. Several types of Coast Metals, Nos. 101, 104, 107, 112 and 113 are excellent for coating hammers. The selection of the proper type depends on various factors, such as analysis of the base metal, the material handled and the degree of abrasion and impact.

Coast Metals are giving exceptional service crushing such abrasive materials as limestone, shale, clay, glass, metal turnings, coal, quartz and silica rock.

COAST METALS Inc. Canton, O.



Mr. Check says:

"J&L PERMASET Pre-formed Wire Rope wears longer— saves you money."

J&L WIRE ROPE

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS • PITTSBURGH, PENNSYLVANIA

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HAVE MARKED ADVANTAGES FOR SAND PLANTS

(1) Close separation for desired specifications; (2) Big tonnage—very low power cost; (3) Start without unloading—great advantage if you operate less than 24 hours a day; (4) Mechanical simplicity.

Built in two general types—high weir and submerged spiral—simplex or duplex, 16" (spiral dia.) up. Doing metallurgical classification, dewatering and washing all over the world. *Write for Bulletin 24 HA and state your specific problems.*

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Main Office & Works Denver, Colo., U. S. A.

SAUERMAN *Long Range* MACHINES

DIG, HAUL and DUMP *in One Operation*

(Above) Two typical Sauerman installations—a Scraper at work in a dry pit and a Cableway in a wet pit.

During more than 30 years of service all over the world, Sauerman Scrapers and Cableways have proved to thousands of users that they are the most economical machines for long range material-handling in general, and especially for pit and bank excavation, river dredging, moving over-burden and stockpiling.

These machines will dig any material that a plough can penetrate. One man controls the entire operation. Power cost and maintenance are exceedingly low per cubic yard of material handled.

A Sauerman machine digs with equal facility under water, on mushy ground, on a hillside or in a rough pit. Operation is continuous-digging, hauling and dumping. Capacities run from 10 to 600 cu. yd. per hour, varying in accordance with size of bucket and length of haul.

Write for Catalog

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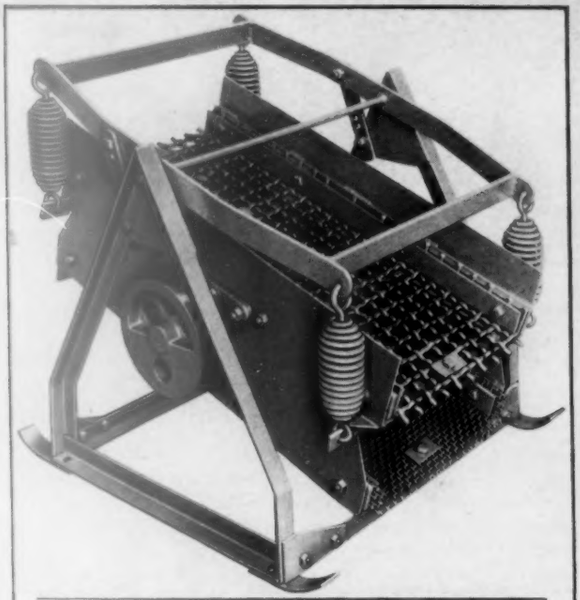

THIS PORTABLE VIBRATING SCREEN
ACCURATELY SEPARATES 100 TONS OF MATERIAL PER DAY INTO 3 PRODUCTS
USES ONLY A 1 H.P. ELECTRIC MOTOR OR 2 H.P. GAS ENGINE
Send for Bulletin No 110

ROBINS CONVEYING BELT COMPANY
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YOUR COPY IS READY

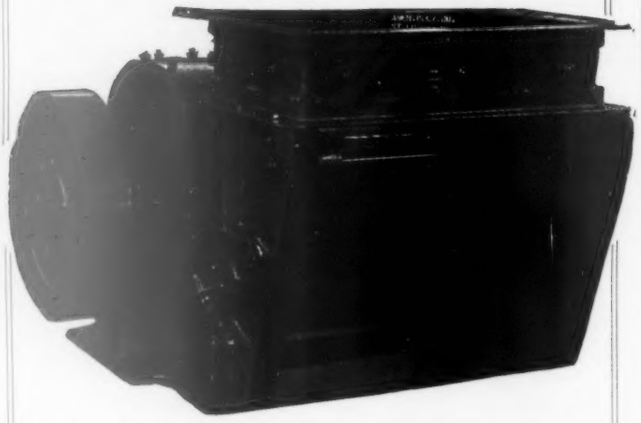
Q-82

34 JOB PHOTOGRAPHS

The new Barber-Greene Bucket Loader Catalog 82 shows 34 photos of B-G Loaders saving time and money on different types of work including: truck loading from stock piles, road shoulder cleanup, top soil stripping, reclaiming, screening, loading scarified base, etc. Also specifications and accessories. Write for your copy.

BARBER GREENE
AURORA ILLINOIS

Join the Army.....of AMERICAN *Users*



Today's rigid specifications insist upon uniformly crushed material, free from chips or slivers. That's the kind of material American Crushers will produce for you . . . day after day, year after year . . . with low maintenance cost, high output and low power consumption. American Crushers have been operating **continuously** for an army of experienced users. Get all the facts by writing to:

AMERICAN PULVERIZER CO.
1059 Macklind Ave. **St. Louis, Mo.**

LOOKING FOR USED EQUIPMENT?

Refer to the listings in the Broadcast Section in this issue for a wide variety of used and surplus machinery and supplies.

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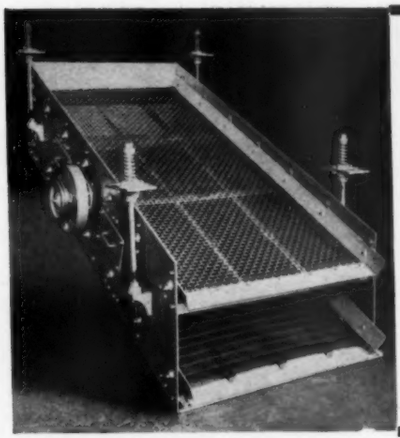
Single and double roll and jaw crushers, hammer mills, super dry pans, — steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists, — complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation

Continuously in Business Since 1835

Hollidaysburg, Pennsylvania



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The Denver-Dillon Vibrating Screen has been proved by over four years of service in numerous industries. Operators report definite reduction in screening costs. "Floating circle" principle requires less than half of the average power of other means of screening. Write today for new Bulletin No. 83-B3.

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67 POUNDS of SPEED and POWER!

Gardner-Denver S73 Sinker

Speed and power to drill faster in harder ground —economical air consumption—powerful rotation —excellent holding characteristics. Weighs 67 pounds. For complete information, write today to Gardner-Denver Company, Quincy, Illinois.

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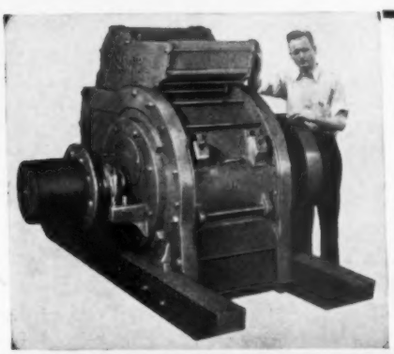

W-I-D-E Crushing Range of DAY Swing Hammer Pulverizers

...makes one machine serve the purpose of two or more other types of crushers. The toughest crushing jobs are "All in a DAY'S work."

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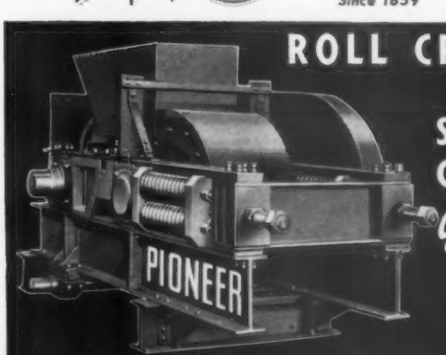
Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE



ROLL CRUSHERS for SECONDARY CRUSHING

Give more tons per hour

PIONEER ENGINEERING WORKS
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SAND DREDGES
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STEAM COIL DRYERS
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Advertise your wants and surplus equipment in

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PERFORATED PLATE
of every description

for maximum productiveness from your vibrating screens.

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Model 900 P & H DIESEL SHOVEL
3 YARD CAPACITY

Shop No. 3842
Boom 40 ft. Sticks 22'
3 cu. yd. full Manganese dipper
Caterpillar Shoes 36"
Power Plant—5 cylinder Fairbanks Morse
10" x 12½"; rated 225 H.P. at 425 R.P.M.
Bail speed 110 F.P.M.
Swing speed 2½ R.P.M.
Weight complete and in working order—310,000#

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EQUIPMENT CORP.

50TH AND GRAYS AVE. PHILADELPHIA, PA.
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CONCRETE EQUIPMENT

Ready-Mix Blaw-Knox concrete plant, complete, large size, splendid condition, unusual opportunity; specifications furnished.

Heltzel bin, 225 ton, 4 compts., weigh batcher.
Blaw-Knox complete ready mix concrete plant.
Butler 100 yd. 3 compt. bin, weigh batcher.
Beaumont 42 yd. two compt. bin.
200 ton rock storage bin, steel, heavy construction.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Smith 1 yd. tilting mixer, electric.
Ransome 28-S 1 yd. Stationary mixer, elec.
1—Halss bucket loader, caterpillar.
Barber-Greene Model 62 loader, cats.

SPECIALS!!

Asphalt emulsion plant complete.
Steel stiff leg derrick, 15 tons, 100 ft. boom.
12"x12" Lidgerwood 3 drum steam hoist.
20,000 gals. oil tanks with heating coils.
42"x48" Traylor Rock Crusher.
I.R. Air Compressor, 310 cu. ft. gas, portable.

BUCKETS—STONE SKIPS

22—Steel stone skips, 2 to 3 yds.
1½ yd. heavy duty Blaw-Knox digging bucket.
1½ yd. Hayward rehandling clamshell.
1¼ yd. heavy duty Blaw-Knox digging clamshell.
¾ yd. Halss rehandling, clamshell.
1 yd. Hayward orange peel, 4 leaf.
¾ yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES

Marion Model 125 Elec. Shovel, 3¼ yds.
2—Marion Diesel shovels, 1¾ yd. cap.
No. 50-B Bucyrus-Erie electric shovel, 2 yds.
Northwest 1½ yd. gas crane, 60' boom.
Lima Model 101 comb. shovel-crane, 1¼ yds.
Marion Steam Shovel, 1¾ yd. capacity.
Ind. Brownhoist loco. crane, electric, 20 tons.
Browning loco. crane, 25 tons, steam.

LOCOMOTIVES—CARS

2—Vulcan 6 ton, gas, 36" gauge.
2—Whitcomb 4½ ton, gas, standard gauge.
8—3 yd. V type 36" ga. side dump cars.

CRUSHERS—PLANT

Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8"; McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x30, 16x32, 36x48, 48x60.
Symons 4' cone Crusher, complete.

RICHARD P. WALSH CO.
30 Church St. New York, N. Y.

Subject to prior sale, we offer the following equipment, all in good condition:

1—Anchor Tamper, Type 4, with new style roller guide and feeder.
2500—8x12x16 and 2000—8x8x16 Malleable Iron, 33⅓%, Cored Pallets for Anchor machine.
1—Kent Stripper for 8" and 12" Blocks.
1—B-2—9 Cu. Ft. Blystone Mixer, with liners and clutch.
1—Hobbs Machine for 8" and 12" Blocks.
1—Hy-test Tile Machine for 5"x8"x12" Blocks.
Can be inspected at our plant — 728 Broad St., Utica, N. Y.

THE AMERICAN HARD WALL PLASTER CO.
Utica, N. Y.

Jaw Crushers—4"x8" up to 66"x84".
Crushing Rolls—16"x10" up to 54"x24"
Gyratory Crushers—No. 3 up to Mammoth
Ring Roll Mills—No. 0, No. 1, No. 1½ and No. 2.
Swing Hammer Mills.
Rotary Fine Crushers—No. 0, No. 1, No. 1½ and No. 2.
Direct Heat Rotary Dryers—3½'x25', 4'x30', 5'x30', 5½'x40', 6'x50', 7'x50' and 8'x50'.
Semi-indirect heat Dryers—5'x30' and 8½'x75'.
Cement Kilns—3' up to 8' diameter.
Hardinge, Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1, No. 2 Roll.
2—6'x12' and 1—4'x10' rod mills.
Tube—Rod and Ball Mills—3' to 6' diameter.
Vibrating Screens—Air Separators.
1—4'x4' and 8'x6' ball mills.
New Dryers built for all purposes.

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FOR SALE

DUMP CARS: Two Clark 30 cu. yd. capacity Air Dump Cars, good condition.

Smith 56-S Tilting Type Concrete Mixer, 2 cubic yard capacity, excellent condition.

Smith 28-S one cubic yard capacity Concrete Mixer, excellent condition.

Williams type P.C. material handling 1½ cubic yard capacity clamshell bucket, excellent condition.

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USED EQUIPMENT FOR SALE

2—Chrysler Royal 8 marine engines, left and right hand with 3:71 reduction gear.
1—75 HP Lathrop 6 cylinder marine engine with Joes reverse gear.
1—10" Morris dredge pump.
1—160 cu. ft. Davey compressor with V belts and motor sheaves.
1—Chicago Pneumatic compressor size 7½x6.
1—No. 5 Austin crusher.
1—3" Self priming Novo water pump.
1—7S Koehring Dandie mixer two wheel pneumatic tired.
1—Ingersoll-Rand Drill steel sharpener with dies and oil furnace.

FRANKFORT EQUIPMENT COMPANY
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REBUILT TRUCK MIXERS

For Rent or Sale

All Sizes
With or Without Trucks
27-E MULTI-FOOTE PAVER
Road Forms—Finishers

THE JAEGER-LEMBO MACHINE Corp.
Corona, N. Y.
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Single Roll Crushers: Ocala 22x30", Penna. 24x24".
Gyratory Crushers: Traylor 12x40", 30x30" and 20" "TYRe-duction. Superior 10", Kennedy 19, 25 & 37, Allis 6 & 9.
2' Symons Cone—3x8' Jigger 3-deck Vib. Screen.
Jaw Crushers: 8x36", 15x36" Univ., 18x36" Cedar Rapids. 10x30" Champion roller bearing, like new.
Two—6x12' Ball Mills, silex lined, balls & drive.
Barber-Greene Loaders: 24, 25, 42, 62 & 82A.
1 yd. Sauerman Cableway, 55 HP, 2-speed.
4x5' Hummer sgl. deck, Vib. Screen & generator.
23 ton McMyler Interstate 8 wheel Gas. Loco. Crane.
Brownhoist ¾ yd. Gasoline Comb. Shovel-Crane. Excellent.

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RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Spikes, Frogs, Switches, Tie Plates, and all other Track Accessories.
Most sizes usually available from warehouse stocks. Every effort made to take care of emergency requirements. **Phone, Write or Wire**

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NEED DUMP CARS?

Immediate Delivery:
7, 30-yd. Western
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Illustrated specifications available—**Other Types of Cars Too.** Also Locomotives, Cranes, Shovels, Etc.

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WIRE ROPE
(Used—Graded)
Imp. Plow Steel with Hemp and IWRC 1" and 1⅛" Dia.
STANDARD MAKES
Write for Particulars
"Large Stock 6 x 7 Sandlines"
GARRY CABLE COMPANY
28 W. 15th St. N. Y. C.

FOR SALE

MAGNETIC PULLEYS

1—No. B 495628A Type Size 18-18—230 AC line Volts. Never been used.
1—Magnetic Pulley consisting of 16" Belt having GE Motor and GE Direct Current generator. Used only four months.

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FOR SALE

One ¾ Orton Crane 45' boom—in very good condition. Priced at $1800.
Complete ¾ yd. Slackline Cableway dipping outfit in excellent condition. Gasoline power. Price $1200.
One complete Slackline Cableway dipping outfit to speed hoist, electric power, ¾ cu. yd. Price $1500.

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1—1¼ Yd. Lima Shovel.
1—1¼ Yd. Osgood Shovel.
1—1¼ Yd. Northwest Shovel.
1—1½ Yd. Insley Full Revolving Shovel.
1—High Pressure Triplex Road Pump.
1—24"x36" 14B Farrell Jaw Crusher.
1—24"x36" 15B Farrell Jaw Crusher.
1—18"x36" Farrell Jaw Crusher.
1—15"x30" Buchanan Jaw Crusher.
1—10"x20" Farrell Jaw Crusher.
1—10"x36" Farrell Jaw Crusher.
1— 6"x36" Farrell Jaw Crusher.
1—16" Traylor Gyratory Crusher.
1— 3' Traylor Gyratory Reduction Crusher.
1—No. 40 Telsmith Gyratory Reduction Crusher.
450' of 36" 7 Ply Conveyor Belt, New.
300' of 30" 6 Ply Conveyor Belt, New.
1—75 H.P. Slip-Ring Motor.
1—12" Pump, Steel Hull, Electric Swintek Dredge.

BLUE BALL MACHINE WORKS
Blue Ball, Pa.

FOR SALE—REBUILT EQPT.

BAY CITY Model "S" combination 1 yd. shovel, crane & dragline.
UNIVERSAL-LORAIN Mod. 35—½ yd. comb. shovel, crane, dragline.
P & H Model 450—1 yd. Shovel.
KOEHRING #1—¾ yd. crane & dragline. Can furnish ¾ yd. Shovel Front.
HEYWARD—1½ yd. clam shell bucket.
WILLIAMS—½ yd. clam shell bucket.
INDUSTRIAL WORKS—25 Ton—8 wheel steam Loco. crane—50 ft. boom.
WHITCOMB Model CS-4—4½ Ton 24" Gauge Gasoline Locomotive.
3—PLYMOUTH Model FL-4 ton 24" Gauge Gasoline Locomotives.
DAVENPORT 22 Ton—4 Wheel saddle tank Type—Std. Ga. Loco. Cyl.—11"x16".
VULCAN—33 ton—4 wheel saddle Tank Type—Std. Ga. Loco. Cyl.—13"x18".
CH&E #11—Triplex Road Pump.
NOVO—40 H.P. Gasoline D.D. Hoist.
CARRY-ALL TRAILERS—10 to 30 Ton.
10—BUDA Model 119 and Model 19-L motor section cars for standard gauge track, Buda air cooled gasoline motor.

Other Type of Equipment, Too

SOUTHERN IRON & EQUIPMENT COMPANY
Plant and General Offices:
ATLANTA, GEORGIA

LOCOMOTIVES SHOVELS — CRANES CARS

1—67 ton Porter 6-wheel Saddle Tank, A.S.M.E. Boiler, Overhauled.
2—38 ton Vulcan 4-wheel Saddle Tanks, A.S.M.E. Boilers, Overhauled.
1—32 ton Porter 4-wheel Saddle Tank, Overhauled.

2—79 ton American 0-6-0 Separate Tender Switchers, Completely Overhauled, I. C. C. Condition, Built 1923.

1—17½ ton Brownhoist Locomotive Crane, Overhauled, New A.S.M.E. Boiler.

Crane or Dragline Fronts for Marion 37 and Bucyrus 50-B, One Each.

1—1½ Yd. Rehandling Clamshell Bucket, Practically New.

Birmingham Rail & Locomotive Co.
BIRMINGHAM, ALABAMA

CRANE

1—**BYERS** 1 yd. full Cat. Gas. Driven Crane, type 35, 40' Lattice Steel Box Type Boom, good condition.

JOHNSON & HOEHLER, INC.
Lansdowne, Del. Co., Penna.

LIQUIDATION

1—Rotary Kiln or Dryer 8'x90', ½" shell.
1—5½'x50' Rotary Dryer.
1—Blaw-Knox 6'x12' NEW Ball Mill, Motor Driven.

2—Ball Mills 7'x10', motor driven.
2—Steel Stacks 5'6"x86' high.
2—Belt Conveyors 16"x50' and 56'.
6—Gould Pyramid Pumps 2" to 4".

1—Allis-Chalmers 5'x22' Compeb. Mill.
5—Rotary Dryers 2'x12', 3'x11', 56" x30', 6'x40', 8'x80'.
2—Jeffrey Hammer Mills 24"x20", 24"x18".
1—Link Belt 3'x8', 2 deck Vibrating Screen.
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1—No. 6 Deister Concentration Table.
1—Allis-Chalmers 9"x15" Jaw Crusher.
1—Plymouth Gasoline Locomotive, 6 ton, 36" gauge.
4—Williams, Gruendler Hammer Mills.

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Fleet of "MACK" DUMP TRUCKS
Models, F G & B X, 7½ to 10 Tons.
HEIL and ATWELL, 6—10 yd. BODIES.
Good Rubber, Overhauled, Repainted, Fine Condition.

For Sale Only

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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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One Complete Hydrated Lime Plant.

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60—12 yd., standard gauge, Dump Cars; steel lined beds.
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Portable compressors & tools—pumps—mixers—derricks—hoists, etc.

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1—15 Ton Lidgerwood Cableway. 300 HP., 3/60/440V.
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Also an 8 wheel electric Brownhoist Track Crane, 50′ boom 80 H.P. G.E. Motor.

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30,000 lbs. at 20 ft. radius; 20,000 lbs. at 30 ft. radius; 10,000 lbs. at 50 ft. radius; 4,000 lbs. at 75 ft. radius.

Wheels 15'-3" center to center of rails. Cab floor to top of rail 13' 5½".

Electrically powered by General Electric Alternating Current Motor, type 4TC, 3 phase 60 cycle, 220 volts, 495 revolutions per minute, 232 amps, intermittent hoist duty, 40 deg. Complete with drum type controller and heavy duty resistors.

Metal housing, cab controlled, complete with ladder.

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Capacity: 8,500 lbs. at 90 ft. radius.
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Slewing Speed: 2 rev per min.
Length of boom: 85 ft.
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33—Diesel Engines, 40 to 1500 Horsepower, with and without Generators.

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400—Wooden Pontoons, 31'6"x3'x6', weight 1800 lbs. each, NEW.

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3—8-ton Iroquois, tandem, steam operated, 3—10-Ton Buffalo Springfield, tandem, steam operated. 1—5-Ton Iroquois, tandem, steam operated. 1—12-Ton Buffalo Springfield, tandem, gasoline operated. 1—10-Ton Austin, 3 wheels, gas. operated.

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25 Ton McMyler Gantry Crane, height of tower 35 ft. Portal clearance—clear height above tracks approx. 22'; clear width between posts approx. 15'.
Length of boom—55 ft.
Boiler: A.S.M.E. vert., 8' high, 54" diam., 125 # pressure.
Lifting capacity: 30' radius, 15,000 #; 40' radius, 12,000 #; 50' radius, 10,000 #.

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One (1) 150 H.P. Thomas Single Drum Electric Hoist. Drum 60" Dia., 36" Face, Grooved for 1" Cable, 8" Shaft, Brake Drum 67½" Dia., 9" Face—G.E. Emergency Brake. G.E. Slip Ring Motor, 150 H.P., 3 Ph., 60 C., 440 V., 720 R.P.M. Serial #5196349 with electric drum controller, disconnect switch, magnetic contactors and resistor bank all mounted on one frame 76"x13'6". Condition same as new.

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(22) 4 Yard Koppel Rocker Dump Cars—Condition Good.
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8000 Feet 30 lb. Rail and 10 Frogs and Switches—Condition Good.
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CONVEYOR and TRANSMISSION BELTING

CONVEYOR BELTING ABRASIVE RESISTANT COVERS

Width	Ply	Top & Bottom Covers
48"	8	1/8" — 1/16"
42"	5	1/8" — 1/16"
36"	6	1/8" — 1/16"
30"	6	1/8" — 1/16"
30"	5	1/8" — 1/16"
24"	5	1/8" — 1/32"
24"	4	1/8" — 1/32"
20"	5	1/8" — 1/32"
20"	4	1/8" — 1/32"
18"	4	1/8" — 1/32"
16"	4	1/8" — 1/32"
14"	4	1/16" — 1/32"
12"	4	1/16" — 1/32"

TRANSMISSION BELTING HEAVY-DUTY—FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

ELEVATOR BELTING HEAVY DUTY—RUBBER COVERED

Width	Ply	Top & Bottom Covers
12"	6	1/16" — 1/16"
14"	6	1/16" — 1/16"
16"	6	1/16" — 1/16"
18"	6	1/16" — 1/16"

ENDLESS "V" BELTS
"A"—WIDTH—All Sizes
"B"—WIDTH— " "
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Sold in Matched Sets

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ALL SIZES FOR
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2—25-Ton 0-4-0 Davenport Locos., S. G. NEW FLUES. EXCELLENT CONDITION. Immediate Delivery.
2—24-Ton Heisler, geared, 36" ga. Locos., A.S.M.E. BOILERS.
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"ANYTHING containing IRON or STEEL"

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Will sell for small cash payment and balance from profits over a long period. Will furnish all orders the plant can handle. Unable to operate because of poor health.

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SAND WASHERS—PUMPS—CONVEYORS

1—4"x12" WHEELING No. 2 Jaw Crusher.
1—BRAND NEW Jaw Crusher 9"x15".
1—8"x15" CLIMAX No. 1½ Jaw Crusher.
1—9"x16" CLIMAX No. 2 Jaw Crusher.
3—12"x26" CHAMPION No. 6 Jaw Crusher.
1—Set STURTEVANT Balanced crushing rolls 21"x10½".
2—M-20 QUAKER CITY Hammer Mills.
1—No. 1 STURTEVANT Open Door Rotary.
1—24" wide LINK-BELT Apron Feeder.
Cranes, Shovels, Hoists, Motors, etc. Sales & Service on UNIVERSAL CRUSHER CO. products.

JOHNSON AND HOEHLER, INC.
LANSDOWNE, PENNA.

FOR SALE

Slackline outfit complete, in excellent condition. Consisting of 100 H.P. slip ring motor, two speed hoist, 80 foot all steel mast, one 2 yd. bucket, one 1⅛ yd. bucket. Priced to sell.

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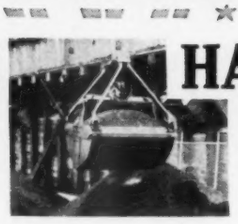

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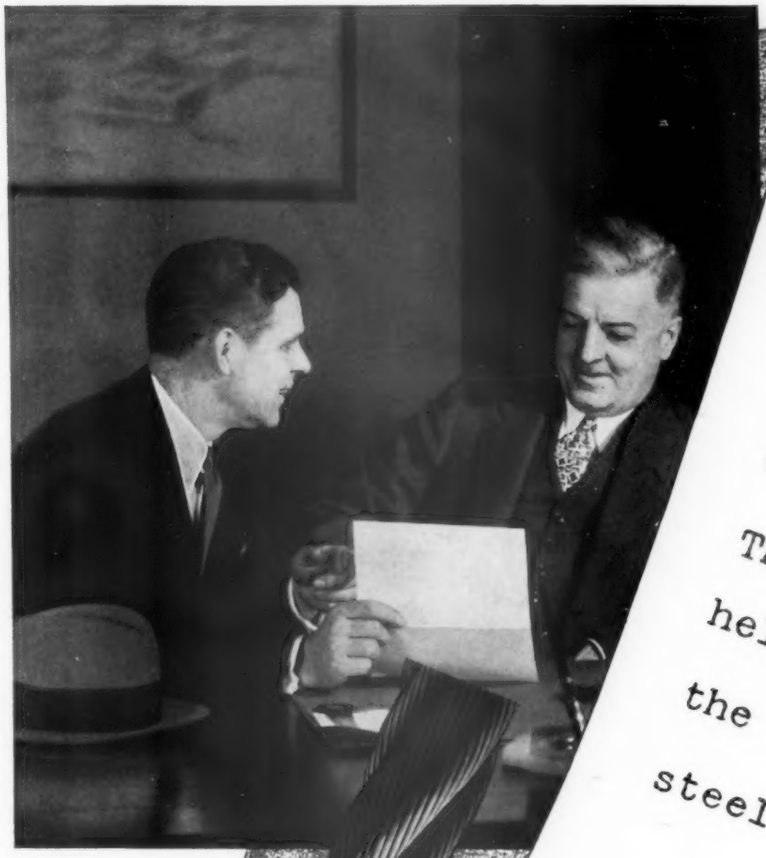

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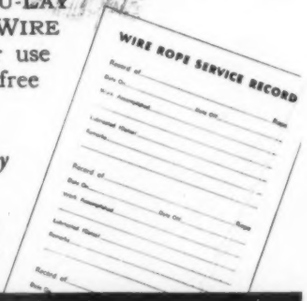

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